المراجعة رقم (1)

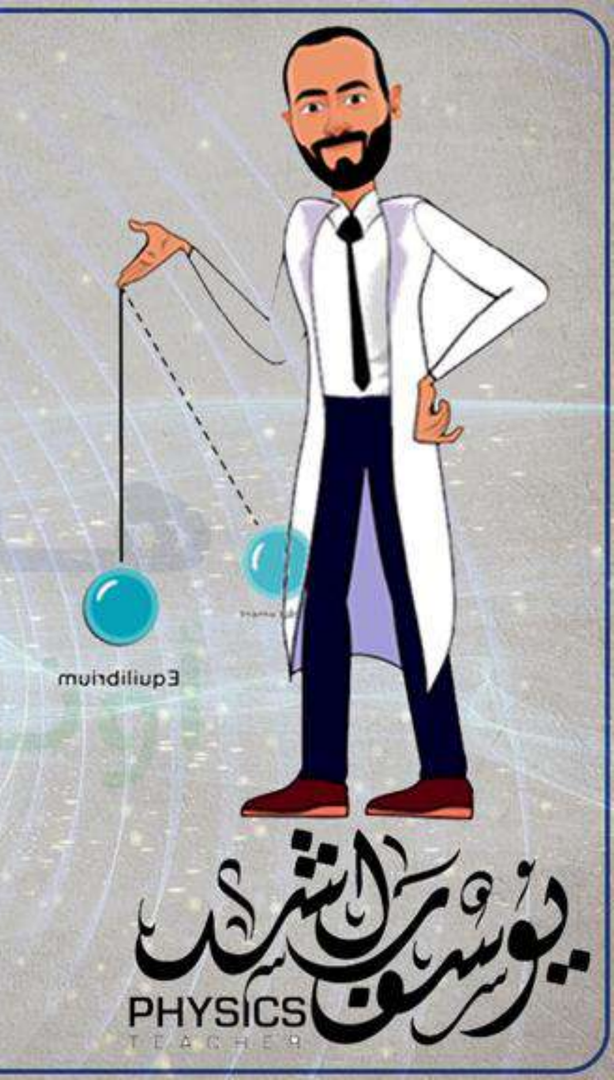


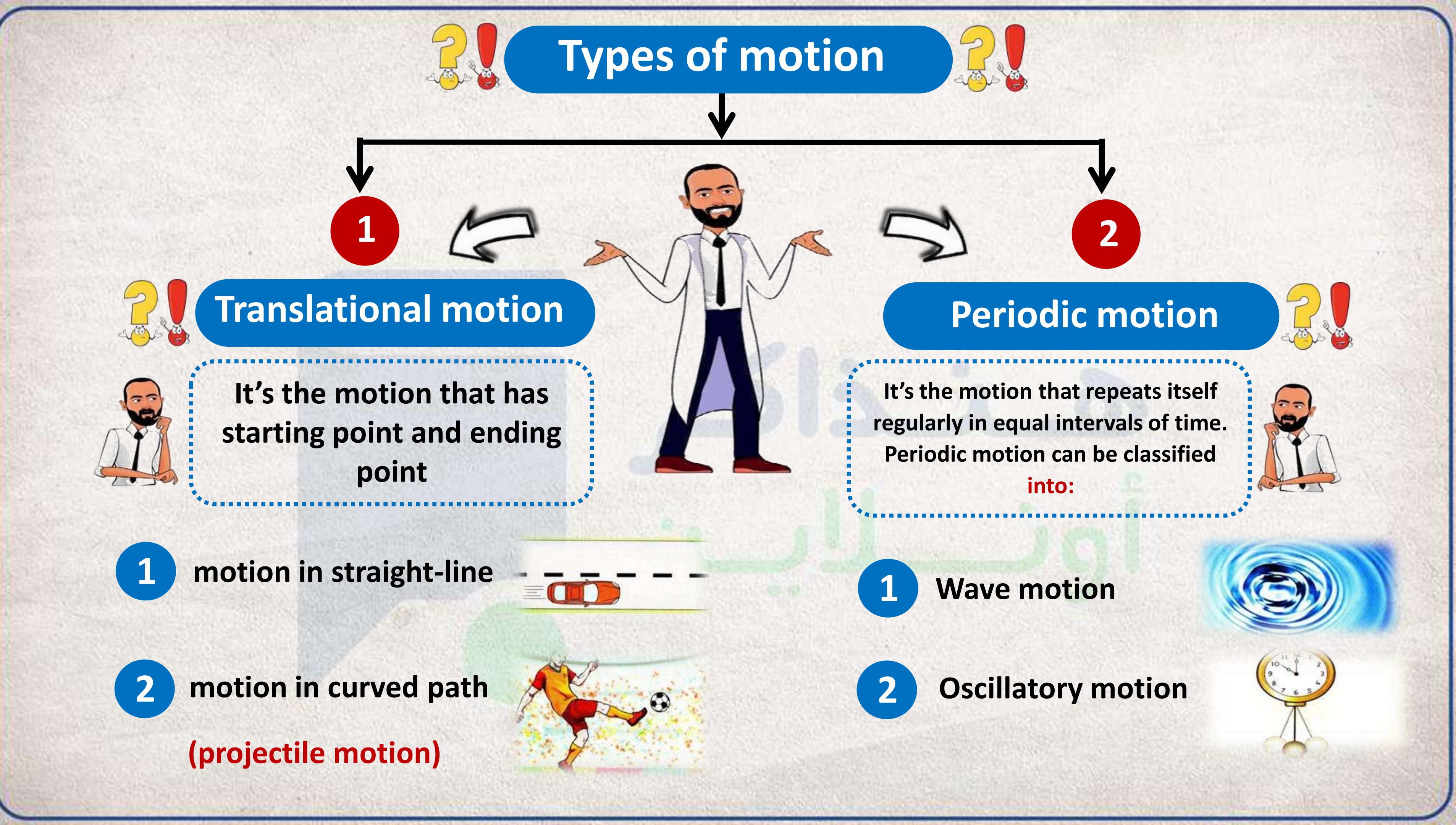




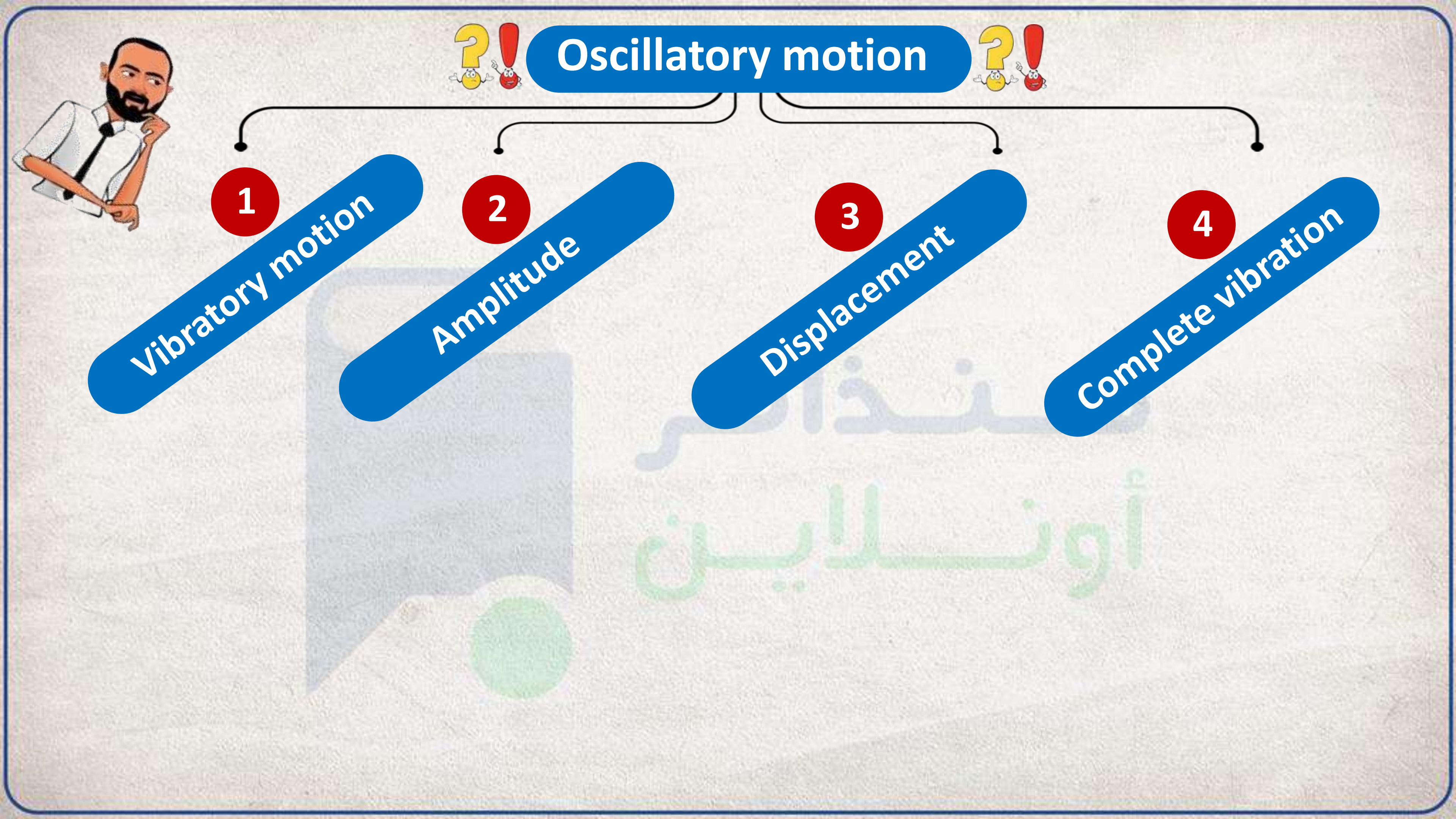
physics

- Chapter 1 Wave Motion
- Chapter 2 Light
- Chapter 3 Hydrodynamics

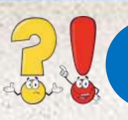




Types of motion
1
Translational motion
It's the motion that has starting point and ending point
1 motion in straight-line
2 motion in curved path
(projectile motion)
2
Periodic motion
It's the motion that repeats itself regularly in equal intervals of time. Periodic motion can be classified into:
1 Wave motion
2 Oscillatory motion



Oscillatory motion
1
Vibratory motion
2
Amplitude
3
Displacement
4
Complete vibration

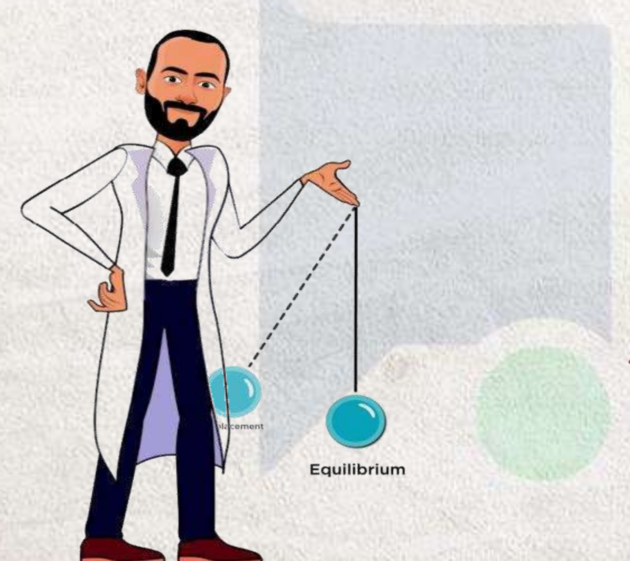


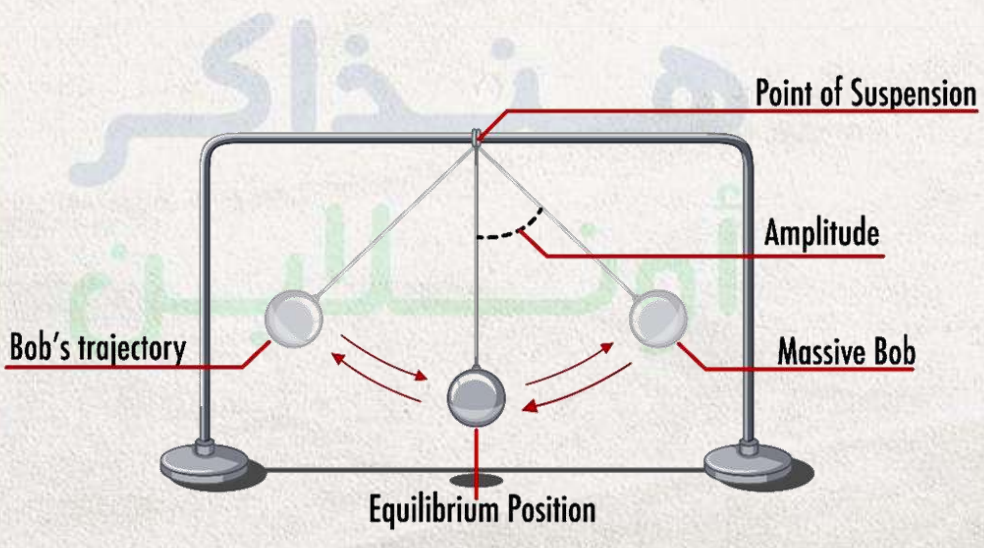
Oscillatory motion



1 Vibratory motion (oscillatory motion)

It's the **motion made by a particle** on both sides away from its rest position.



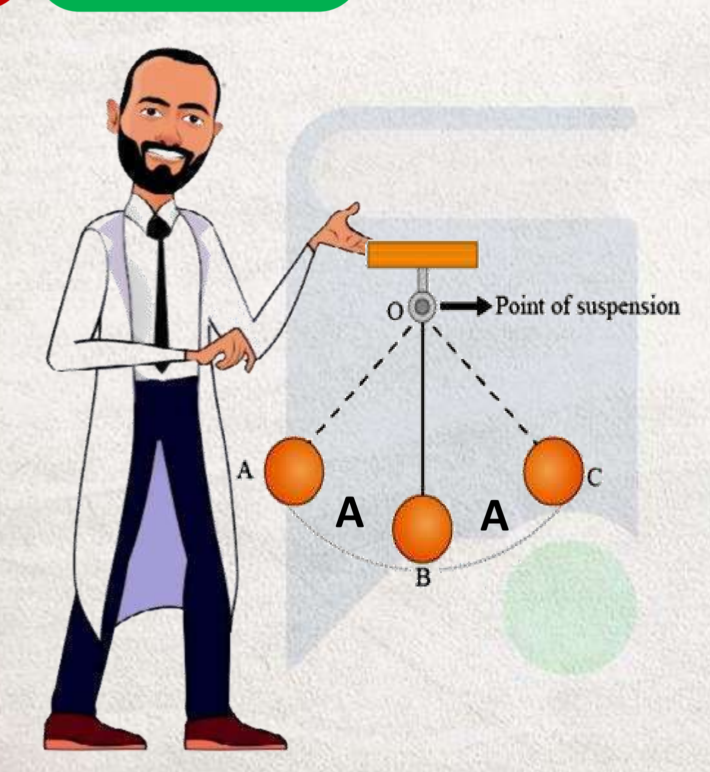




Oscillatory motion



2 Amplitude



It's the **maximum displacement** done by a vibrating body away from its rest position.

Or It's the **distance between to points** where the velocity at one point is maximum & at the other is zero.

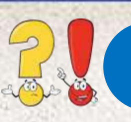
Or It's the **distance between the position** at which K.E is maximum & P.E is zero & other position of contra conditions.



3 Displacement

It's the distance covered by the body between its position at any instant & its position at rest.

O
Point of suspension
A
B
C



Oscillatory motion



4 Complete vibration or (Wave form)

It's the disturbance when a vibrating particle passes by a fixed point two successive times in the same direction.

Point of suspension

O

A

B

C



Periodic time "T"





It's the time taken by a vibrating body to make one complete vibration or cycle.

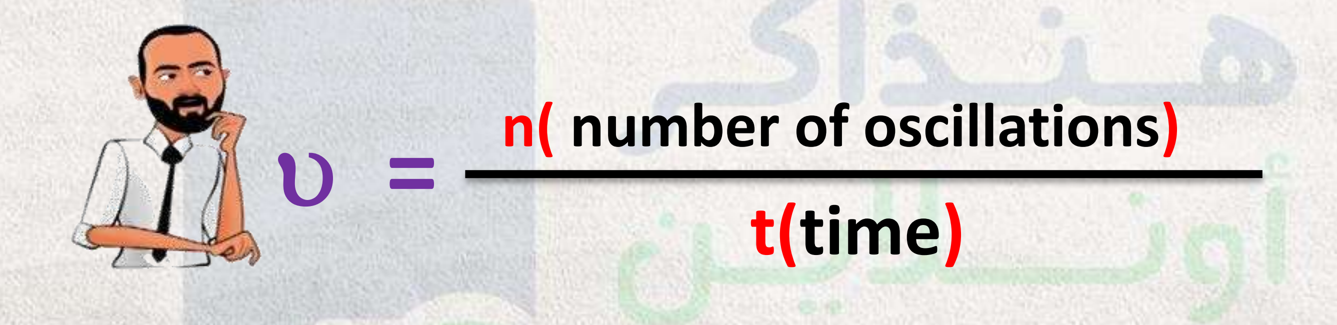
$$T = \frac{t\ (\text{time in second})}{n\ (\text{number of complete oscillations})}$$

$$T = 4 \times \text{Time of amplitude}$$



It's the no of complete cycles or vibrations done by a vibrating body in one second

Its unit is K.HZ = 10^3 HZ & Mega Hz = 10^6 Hz



$$\upsilon = \frac{n(\text{ number of oscillations})}{t(\text{time})}$$



Phase



It is the **position** & **velocity and direction** of a certain molecule at a certain instant

Difference: 0°

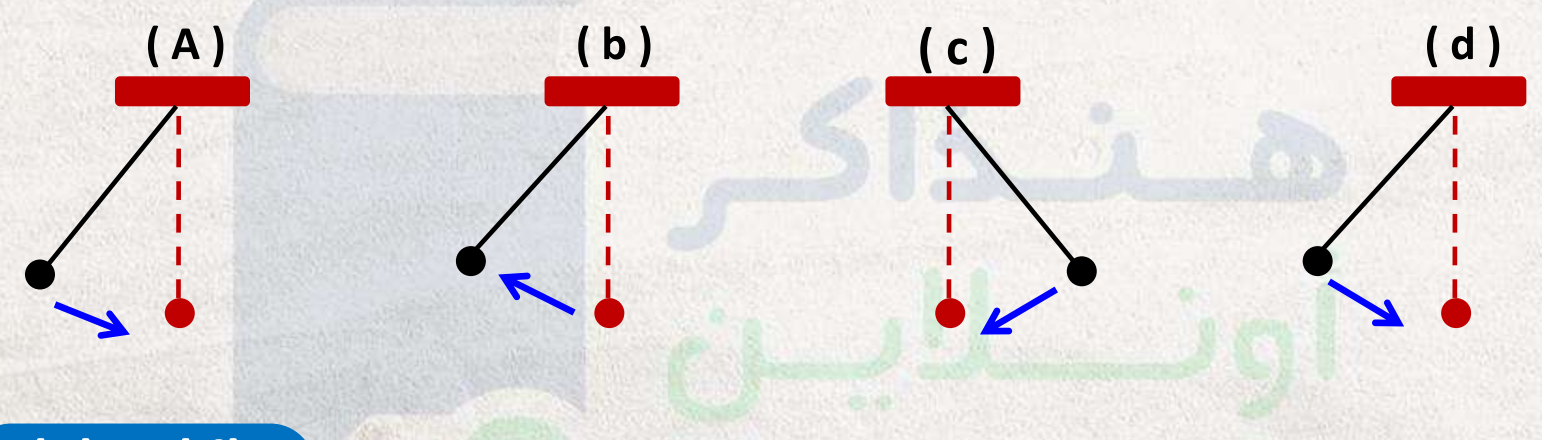
In Phase



Important notes



If two **bodies vibrate** having the same phase that means that they have the same **velocity & direction** as the following



(a) & (d) have the same **direction & velocity**

(b) & (c) have the same **same direction** but not the same velocity.



Example for vibrating bodies



(simple harmonic motion)

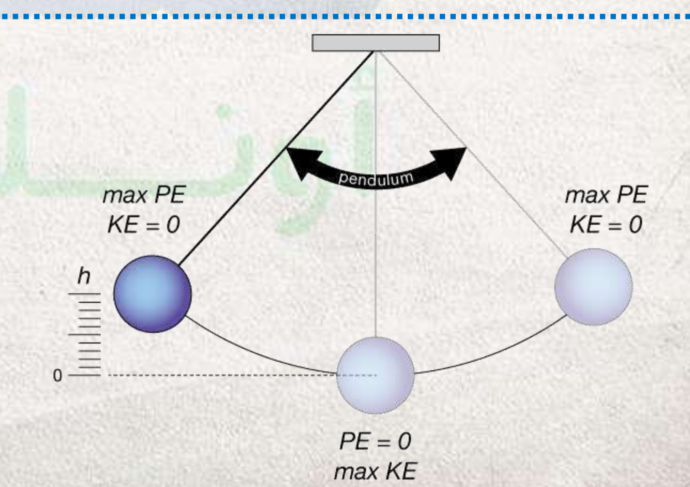
Motion of a simple pendulum

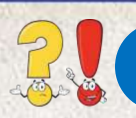
In which the displacement increases from the starting point (A) to +ve maximum value at (B) then it decreases to zero at (A) then increases to -ve max value at (C) then decreases to zero at (A) and repeat itself through uniform intervals of time.

$$E = KE + P.E$$

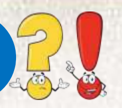
$$K.E = \frac{1}{2} mv^2$$

$$P.E = mgh$$

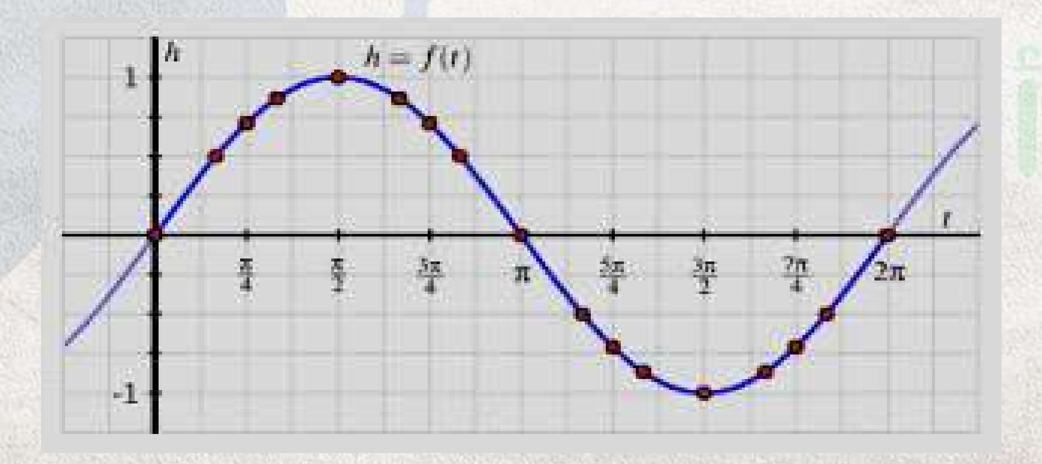




Oscillatory motion graph



Position	A	B	C
Displacement	0	Y	-Y
Velocity	Max	0	0
P.E	Min	Max	Max
K.E	Max	0	0





Notes

1. if the body starts motion from the position at which the velocity is zero then the curve is drawn as a sin curve

2. If the body starts its motion from the position at which the velocity is maximum then the curve is a cos curve.

Sin curve

V=O V=max V=O V=max V=O

a b c b a

Cosine curve

V=max V=O V=max V=O V=max

b c b a b

(A) (C)

(B)



In the opposite figure ….

If the time taken by the pendulum to move from A to C is 0.8 s, calculate

1) The periodic time



0.6



2



1.6



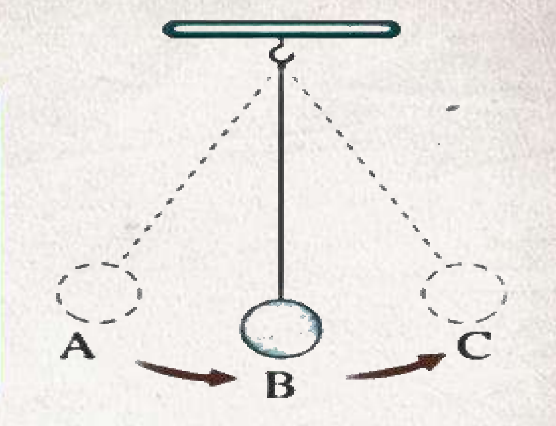
5



In the opposite figure ….

If the time taken by the pendulum to move from A to C is 0.8 s, calculate

2) The frequency





- 0.625
- 2
- 0.6
- 5



In the opposite figure ….

If the time taken by the pendulum to move from A to C is 0.8 s, calculate

3) The number of complete oscillations through 16s.

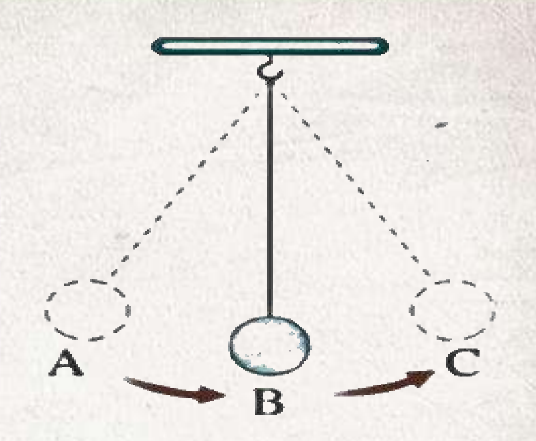
- 15
- 10
- 9
- 13



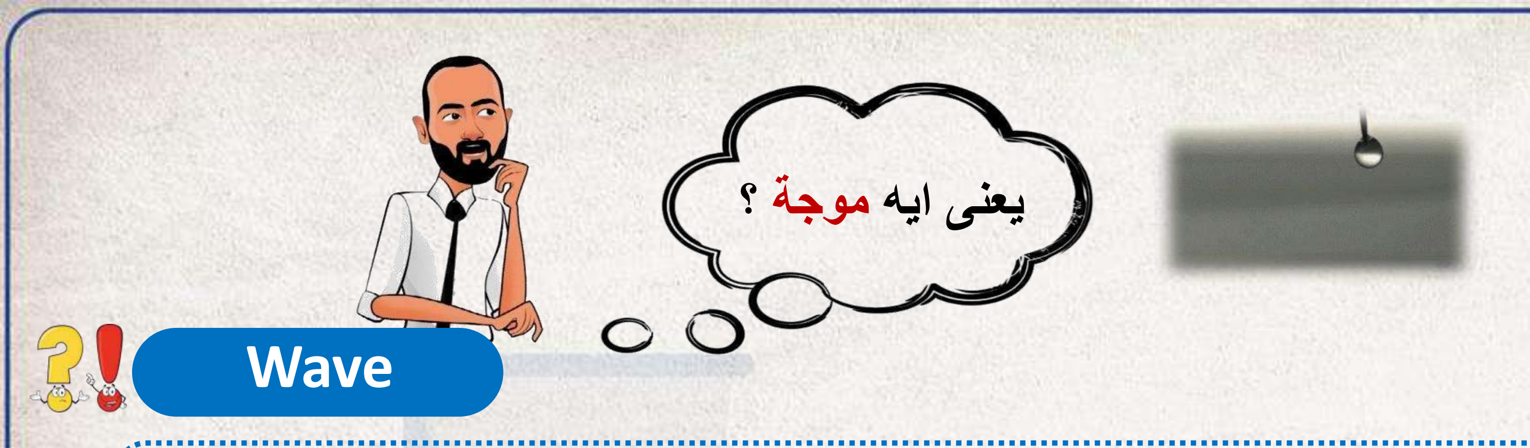
In the opposite figure ....

If the time taken by the pendulum to move from A to C is 0.8 s, calculate

4) The time required to make 50 oscillations



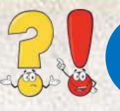
- 80s
- 60s
- 75 s
- 60s



Wave

It's a **disturbance that can propagate transferring energy** in the direction of propagation without any transfer in the medium particles.

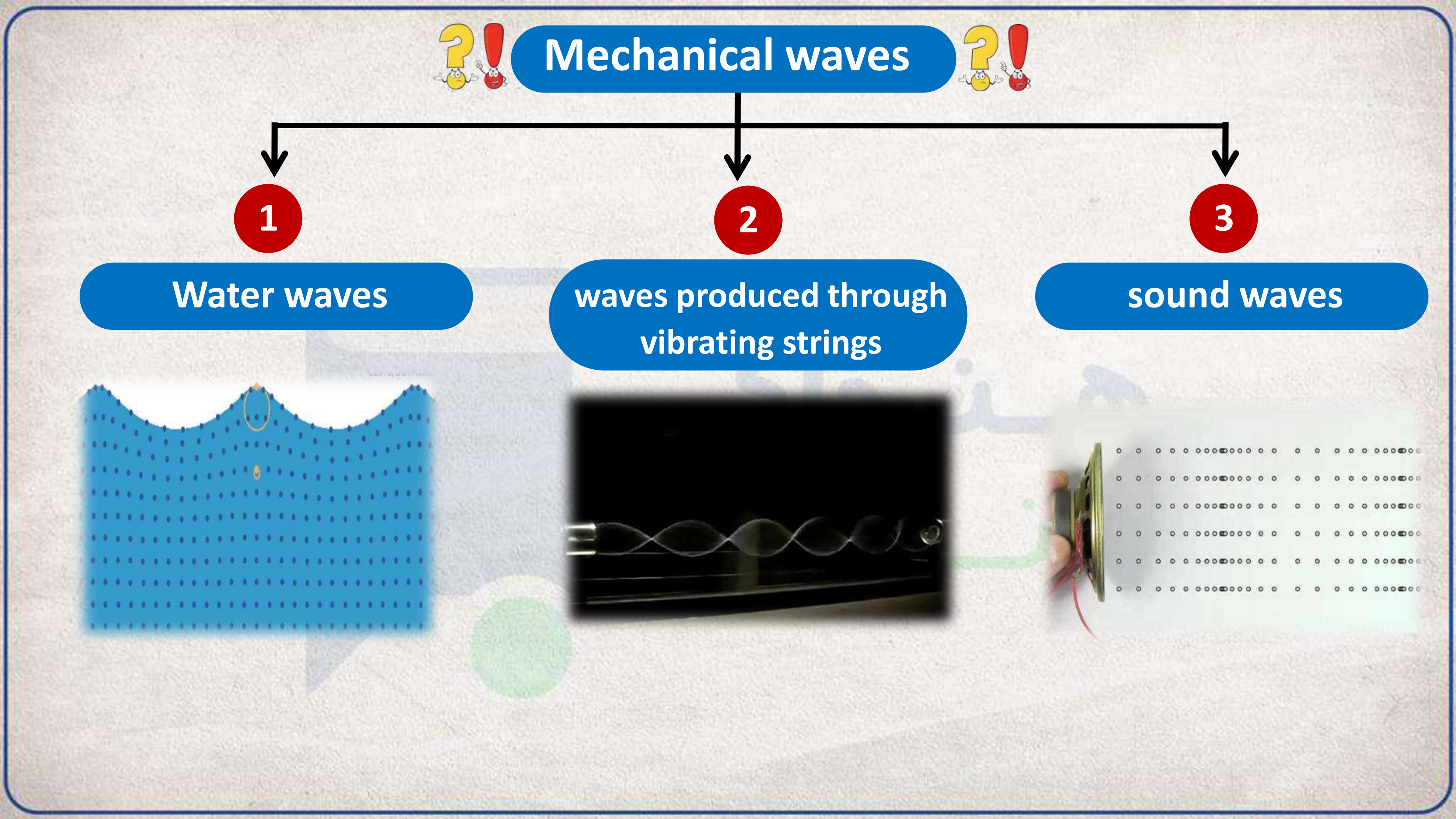


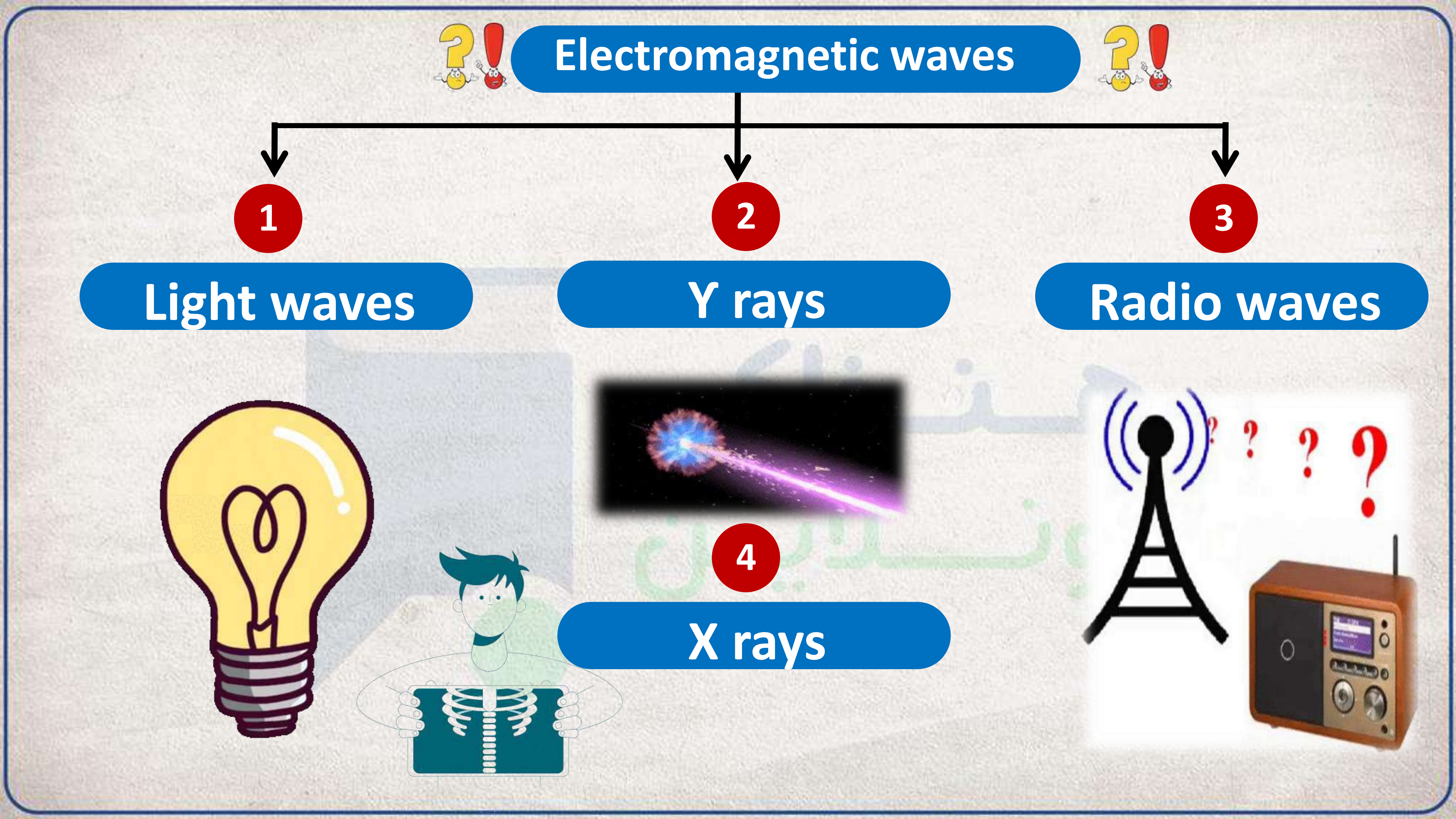


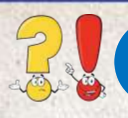
Mechanical Waves & Electromagnetic waves



Mechanical Waves	Electromagnetic waves
It’s a disturbance needs a medium to propagate.	It’s the disturbance propagates in space and other media.
It’s formed from transverse or longitudinal waves.	It’s formed from transverse waves only.
Formed from the vibration of the particles of the medium.	Formed from the vibration of electric & magnetic fields, which is perpendicular to each other & perpendicular to the direction of wave propagation.


Mechanical waves
1
Water waves
2
waves produced through vibrating strings
3
sound waves


Electromagnetic waves
1
Light waves
2
Y rays
3
Radio waves
4
X rays



Mechanical wave



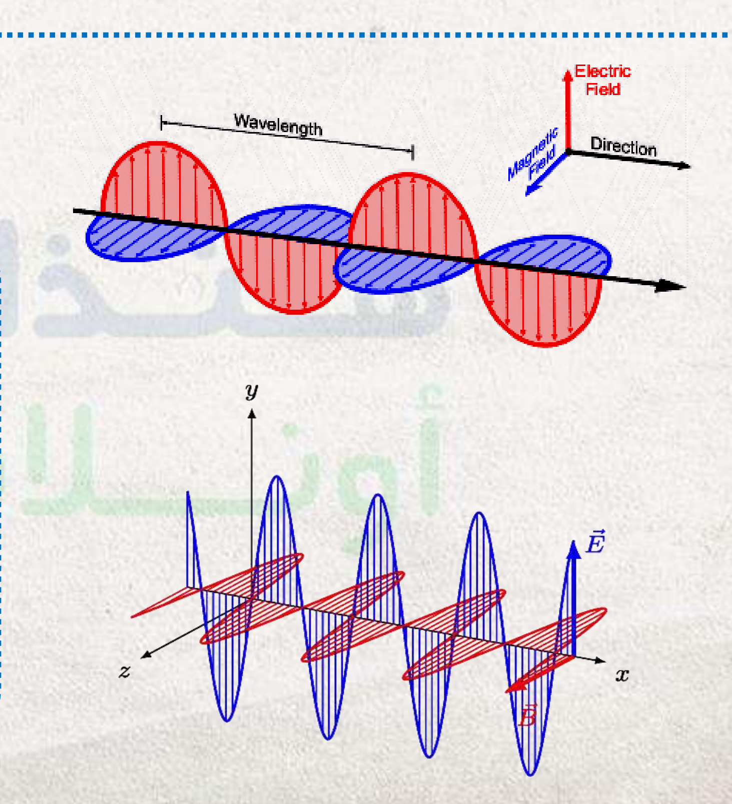
It is a **disturbance that propagates** in materialistic media



Electromagnetic waves



They are **waves originated** from vibrating electric and magnetic fields having the same phase with frequency **(ν)**, perpendicular to each other and to the direction of the wave propagation and can spread in materialistic media and in space.





Give reasons



1 We see the light produced from the cosmic explosions and we don't hear the sound produced from them.

Because

the light is an electromagnetic wave that can propagate through the space while the sound is a mechanical wave that needs a medium to propagate and cannot propagate through space.

Give reasons



2 Astronauts use wireless devices on the moon surface.

Because

there is no medium on the moon, so the sound cannot propagate through space.

Or

sound is a mechanical wave that needs medium to propagate and cannot propagate through space.



Give reasons

3 The electromagnetic waves propagate through space.

Because

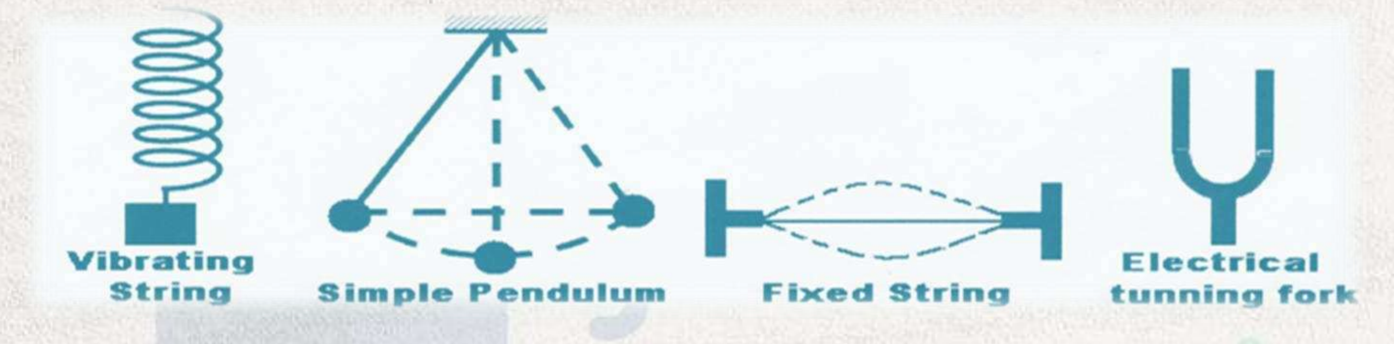
it consists of two fields electric and magnetic perpendicular to each other where both of them don’t need medium to propagate through.



Conditions required for producing mechanical waves

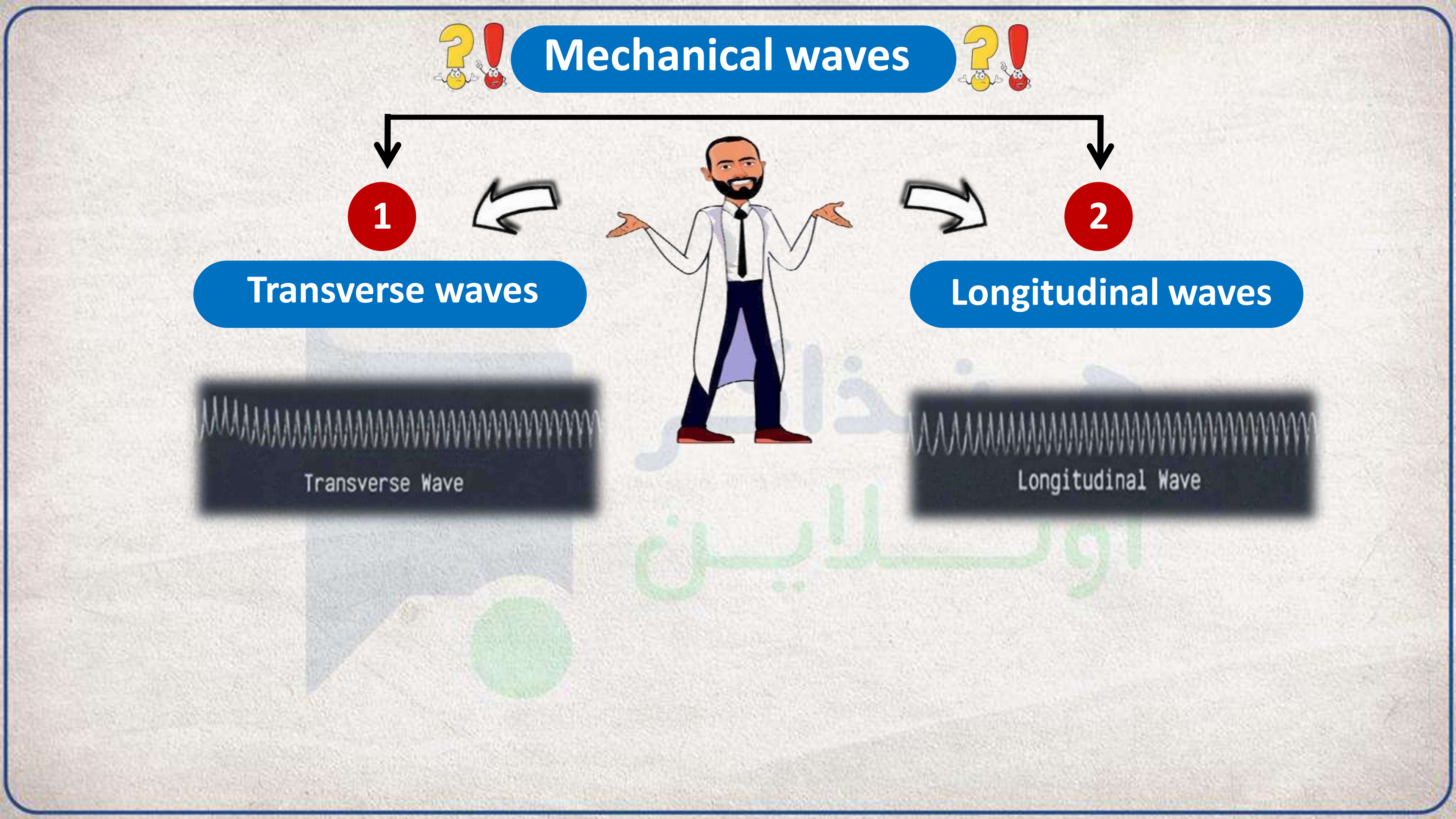


1. Vibrating source (pendulum – Fork - stretched wire).



2. A disturbance to transfer energy from the source to the medium.

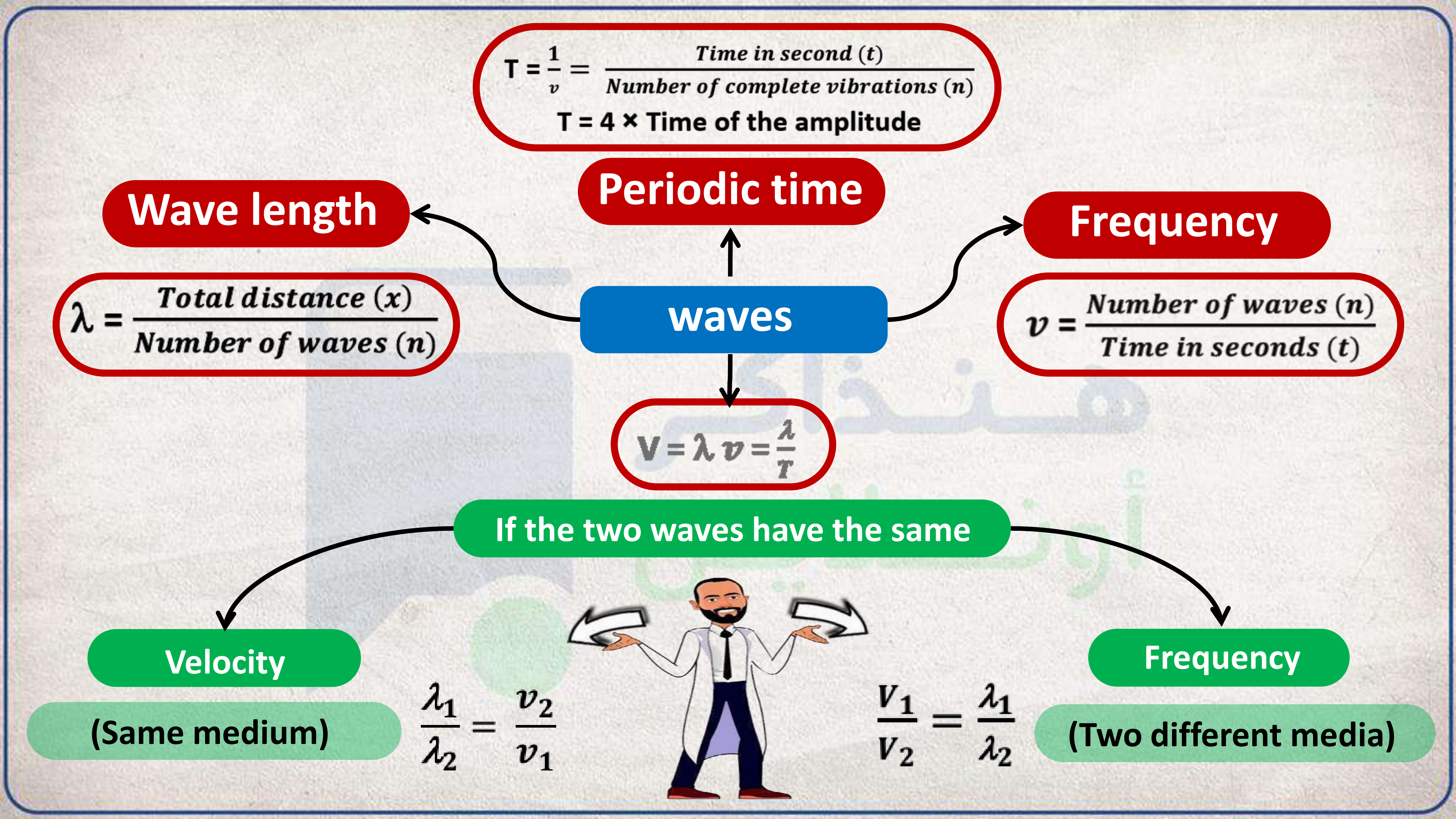
3. A medium that carry the disturbance.



Mechanical waves
1
Transverse waves
2
Longitudinal waves
Transverse Wave
Longitudinal Wave

Transverse waves & Longitudinal waves

	1 Transverse waves	2 Longitudinal waves
Wave form	Crest λ Crest Trough λ Trough	Rarefaction λ λ Compression
Direction of vibration of medium particles	Perpendicular to the direction of wave propagation.	Along the line of wave propagation.
Composition	Crests and troughs	Compressions and rarefactions
Wavelength	The distance between two successive crests or two successive troughs.	The distance between the centers of two successive compressions or the centers of two successive rarefactions.
Examples	• Propagating waves in strings. • Waves on water surface.	• Sound waves in gases. • Waves inside water.



$T = \frac{1}{\nu} = \frac{\text{Time in second } (t)}{\text{Number of complete vibrations } (n)}$
T = 4 × Time of the amplitude
Periodic time
Wave length
Frequency
$\lambda = \frac{\text{Total distance } (x)}{\text{Number of waves } (n)}$
waves
$\nu = \frac{\text{Number of waves } (n)}{\text{Time in seconds } (t)}$
$V = \lambda \nu = \frac{\lambda}{T}$
If the two waves have the same
Velocity
(Same medium)
$\frac{\lambda_1}{\lambda_2} = \frac{\nu_2}{\nu_1}$
$\frac{V_1}{V_2} = \frac{\lambda_1}{\lambda_2}$
Frequency
(Two different media)

1

Main Point

The propagation of the transverse wave in a medium requires the ability of molecules of the medium to vibrate and the existence of a certain cohesive forces between the molecules of the medium, therefore it is transfer in liquid and in solids, but not propagate in the gases.





2

When wave is occurs in water, then:

a on the surface, there is a transverse wave .
(Due to being of cohesive forces between the molecules of water, they vibrate perpendicular to direction of wave propagation to form crests and troughs).

b At the depth , there is a longitudinal wave.
(Because the attraction force between the molecules of water at the bottom is minimum value or weak , so they vibrate along the direction of wave propagation to form compressions and rarefactions).



3

Main Point

To calculate wavelength

$$\lambda = \frac{X}{N}$$

- **x : displacement covered by wave.**
- **N : number of waves**

4

Main Point

Calculation of number of wavelengths, starting from the crest or the trough to another one of the same phase then:

no of wavelengths = no greater order - no lowest order



5

Main Point

Calculation of number of wavelengths, starting from the crest to the trough then:

no of wavelengths=

(no greatest order - no lowest order)+ 1/2



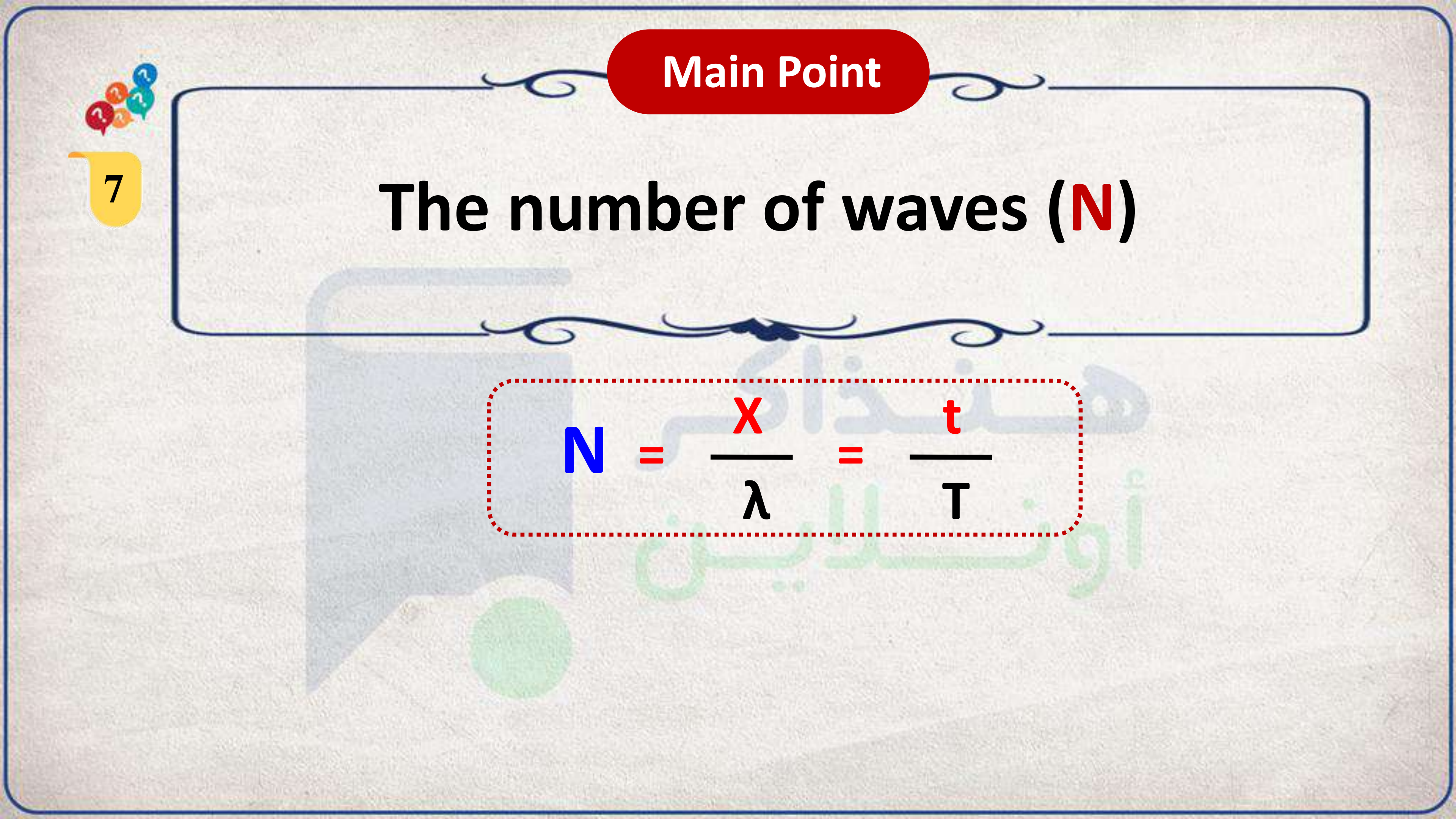
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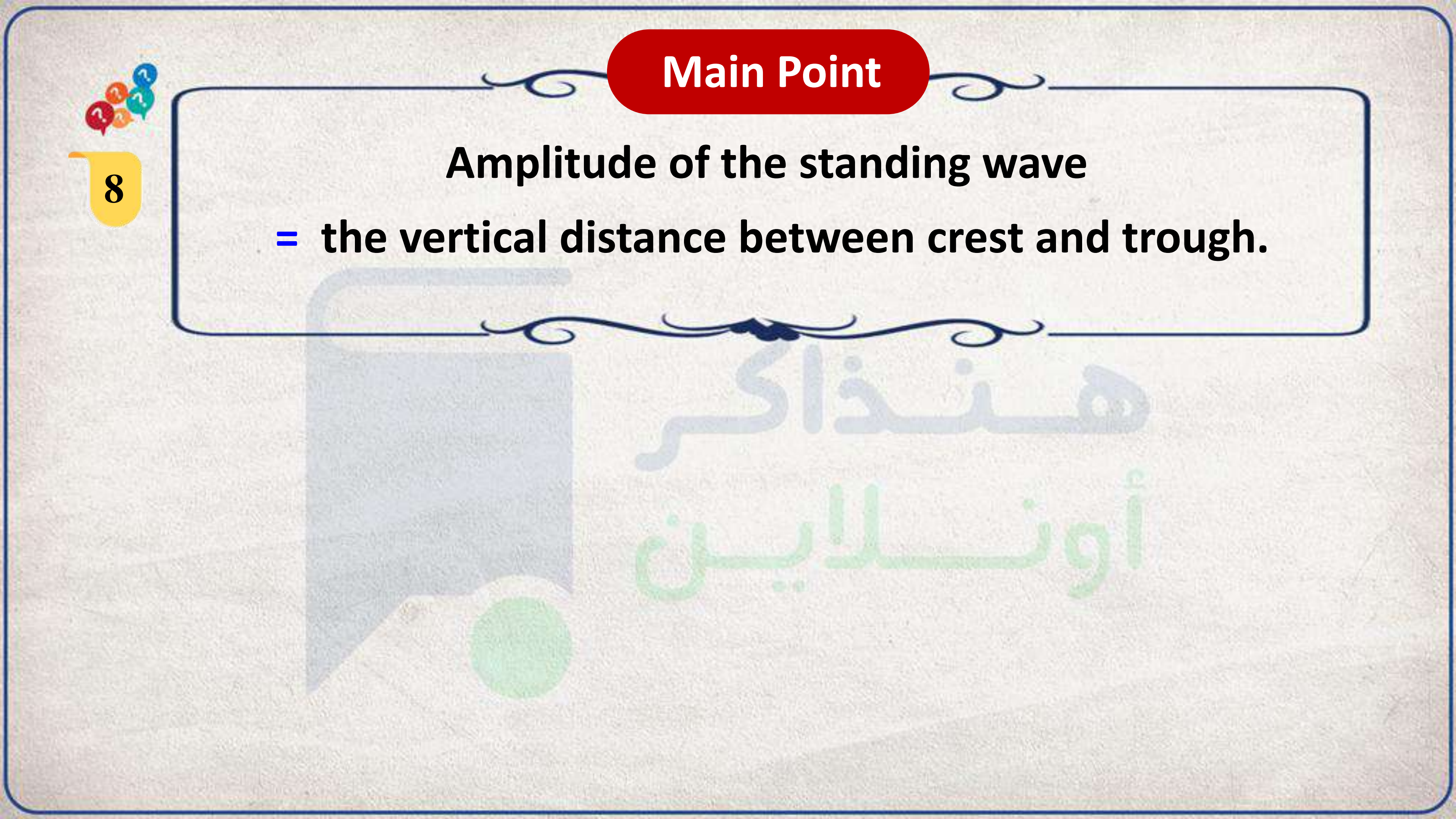
Main Point

Calculation of number of wave lengths, starting from the trough to the crest then:

no of wavelengths=

(no greatest order - no lowest order)- 1/2


Main Point
7
The number of waves (N)
$N = \frac{X}{\lambda} = \frac{t}{T}$


Main Point
8
Amplitude of the standing wave
= the vertical distance between crest and trough.

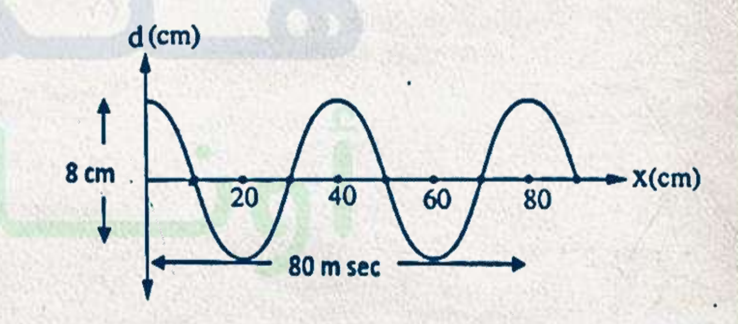
1

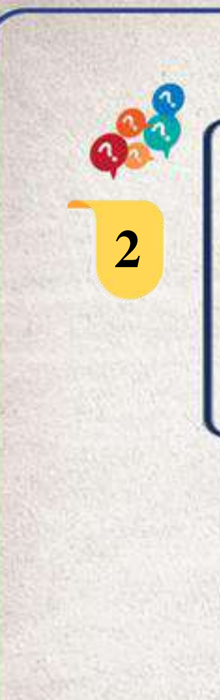
The figure shows a transverse wave, Find

The wave length -- The period time -- The frequency

-- The amplitude -- The velocity

1. Length = ...
2. period time = ...
3. frequency = ...
4. amplitude = ...
5. velocity = ...





Two tones have frequencies 680 Hz and 425 Hz propagate in the same medium. If the wavelength of one of them exceeds the wavelength of the other wave by 30 cm, calculate the velocity of sound in air

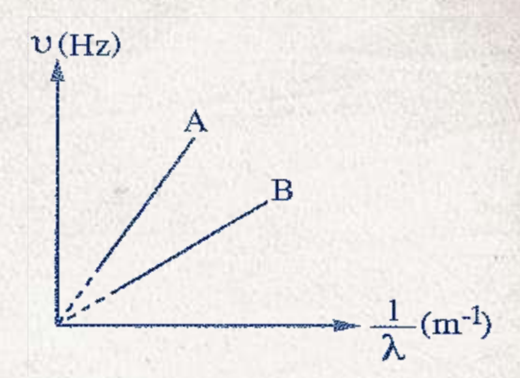


A girl stood on the beach to watch the waves. She observed that every two seconds, four waves pass in front of her and each wave has a length of 0.5 m. So, the wave velocity is ……

- 0.2 m/s
- 0.25 m/s
- 0.5 m/s
- 1 m/s



If the opposite graph shows the relation between frequency and wavelength for a range of frequencies different ....of ultrasonic waves through two media (A , B) , so



- VA> VB
- VA< VB
- VA = VB
- not enough data for conclusions



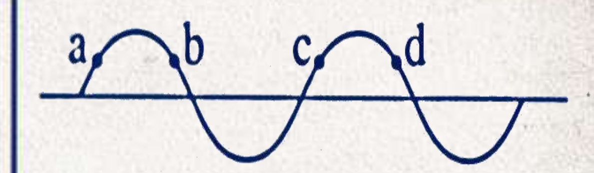
If the time interval between the first crest and the tenth crest in a wave motion is 0.2 s, then the frequency is.

- 45Hz
- 50Hz
- 55Hz
- 60Hz



In the opposite figure:

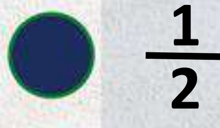
Points …………. Have the same phase.



- **(a,b,c)**
- **(b,c)**
- **(a,b)**
- **(b,d)**



Two sound waves of frequencies 300 Hz, 600 Hz travels in air, so the ratio between their speeds is ………



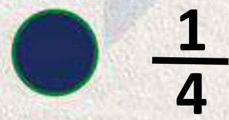
$\frac{1}{2}$



1



2



$\frac{1}{4}$

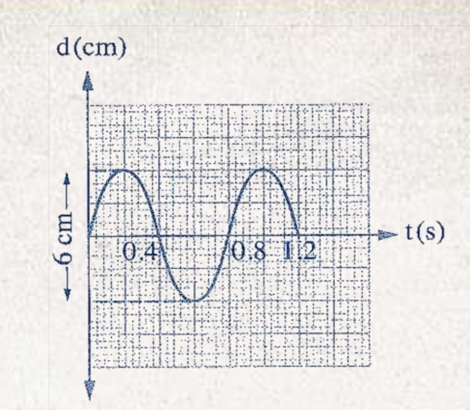


A drop of water fell on the surface of a still water, so a 120 wave ripples are produced during half minute. If the radius of the external circle is 3 m, the speed of propagation of the wave equals ……

- 0.01 m/s
- 0.1 m/s
- 0.5 m/s
- 1 m/s



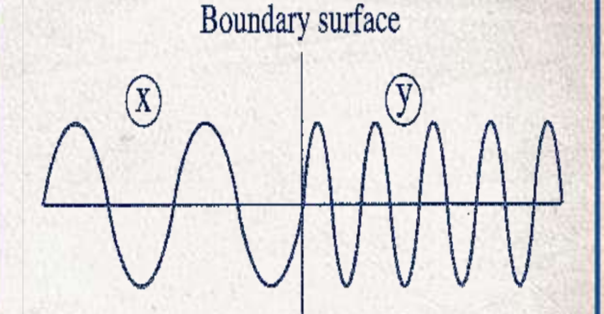
The opposite (displacement – time) graph depicts the motion of one point in a transverse wave transmission medium, so ......



	Amplitude (A) cm	Frequency (ν) Hz
A	6	2.5
B	6	0.4
C	3	1.25
D	3	0.8



The opposite figure shows a wave which is traveling through a medium (x) then it moves to another medium (y), so the ratio between the speed of the wave in medium (x) to its speed in medium (y) is ....



- greater than one
- less than one
- one
- indeterminable



A wave of frequency $\nu 1$ and wavelength $\lambda 1$ propagates in a medium with speed v1 if this wave travels from this medium to another medium where its speed becomes 2/3 v1 , then ....

- the frequency $\nu 1$ remains constant and the wavelength becomes $3/2\ \lambda 1$.
- the frequency $\nu 1$ remains constant and wavelength becomes $2/3\ \lambda 1$.
- the wavelength $\lambda 1$ remains constant and the frequency becomes $3/2\ \nu 1$
- the wavelength $\lambda 1$ remains constant and the frequency becomes $2/3\ \nu 1$



Disturbance that propagates and transfers the energy in the same direction of wave the propagation

- wave
- mechanical wave
- complete oscillation
- displacement


How do we see the light produced from the cosmic
Explosion as a sun

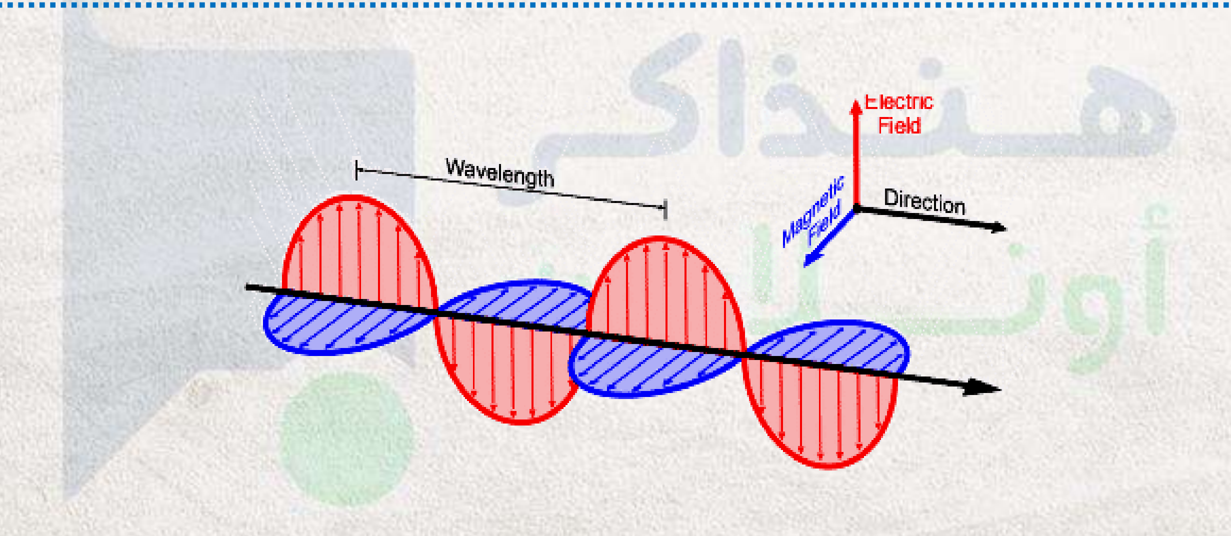

How can we see an objects ?



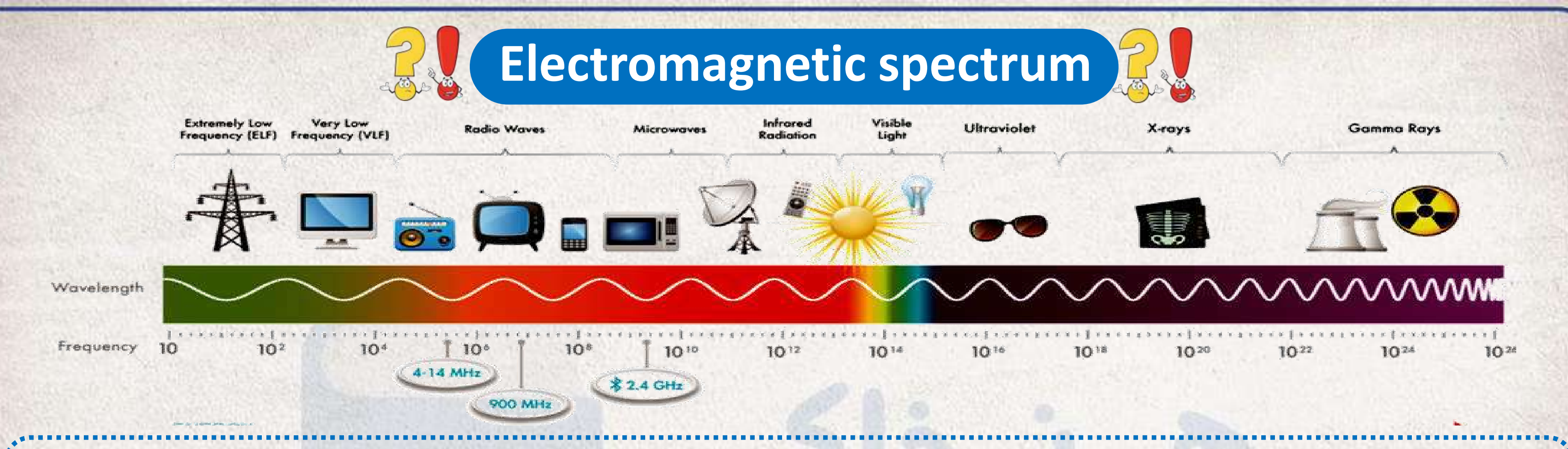
Electromagnetic waves



They consist of two vibrating fields, electric and magnetic field having same frequency, same amplitude and are perpendicular on each other and to the direction of propagation.



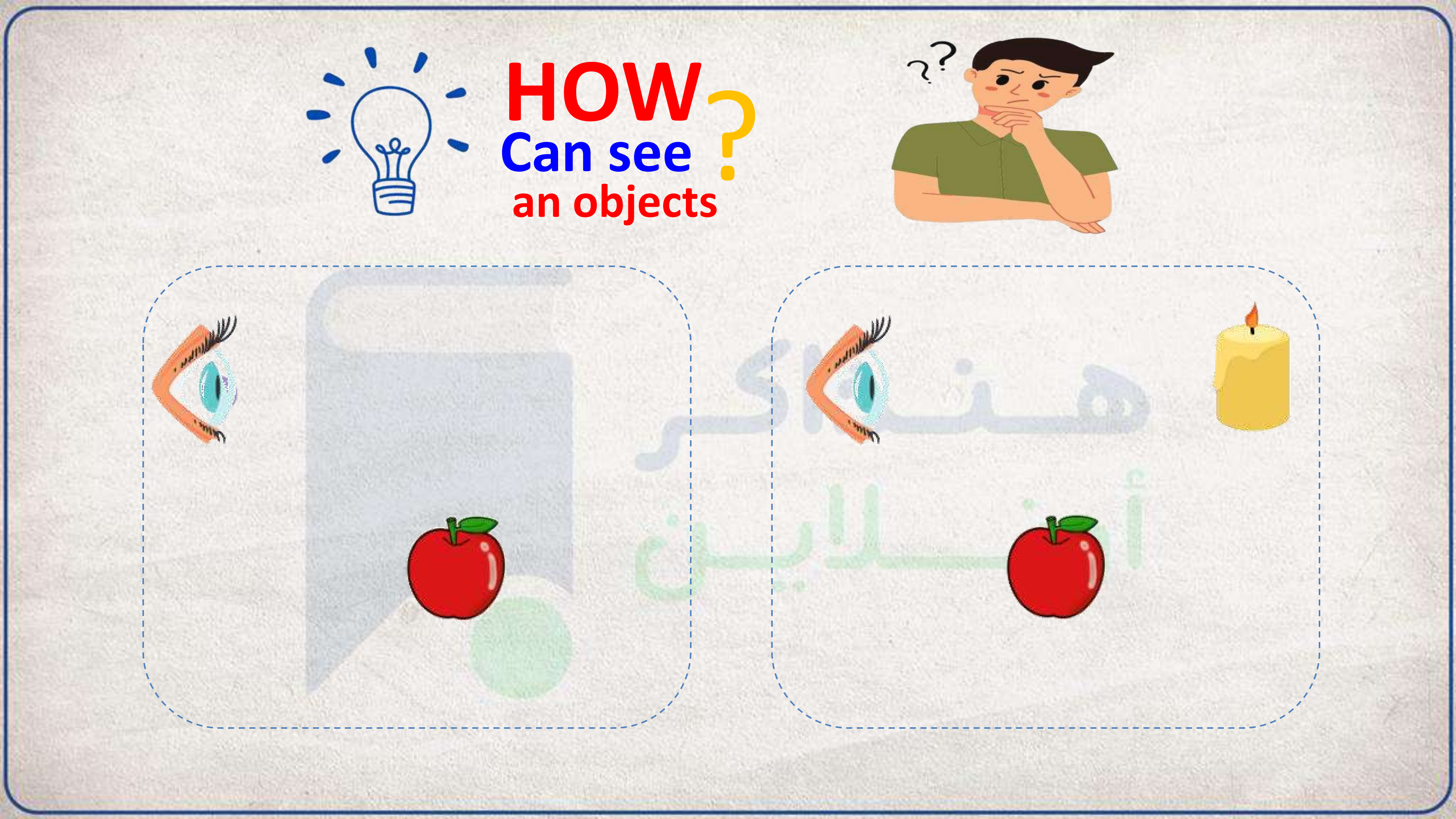
Electromagnetic spectrum



It is the distribution and arrangement of electromagnetic waves according to their wavelengths or their frequencies.

The visible spectrum from 4000A° to 7000 A°

Infra red (IR) more than 7000 A° and Ultra violet (UV) less than 4000 A°.

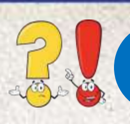

HOW
Can see
an objects
?



1. Light Propagation
2. Light Reflection
3. Light Refraction
4. Light Interference
5. Light Diffraction


1 Light Propagation





Properties of visible light waves



2 Light Reflection

Normal line

Angle of reflection

Angle of incidence

Reflected light ray

(ϕ_2) (ϕ_1)

Incident light ray

Reflecting surface

Point of incidence

Tracing

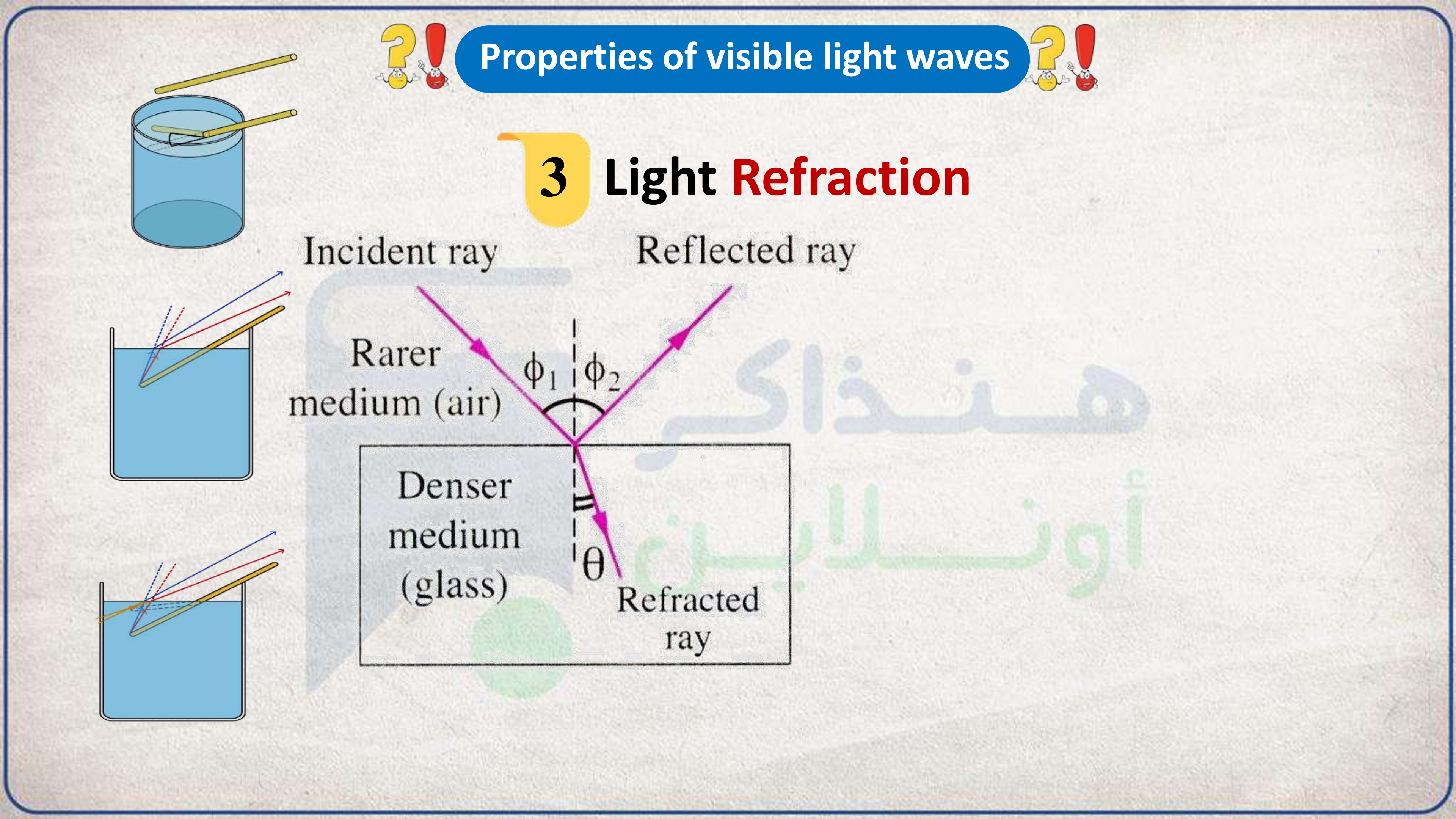
Three plane mirrors are found as three sides of a square as in the opposite figure. Trace the path of a light ray that falls on one of them until its reflection from the three mirrors.



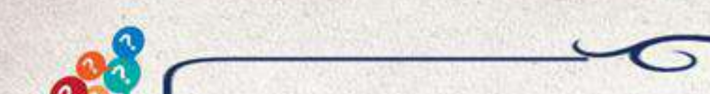
Trace (Follow) the path of the light ray



Fig (1)



Properties of visible light waves
3 Light Refraction
Incident ray
Reflected ray
Rarer medium (air)
ϕ_1
ϕ_2
Denser medium (glass)
θ
Refracted ray



Main Point

1

The light refracted between two optical media due to the change in the velocity of light in these media, so that.

$$ {}_1n_2 = \frac{V_1}{V_2} = \frac{\mathrm{Sin}\,\Phi}{\mathrm{Sin}\,\theta} = \frac{\lambda_1}{\lambda_2} = \frac{n_2}{n_1} $$



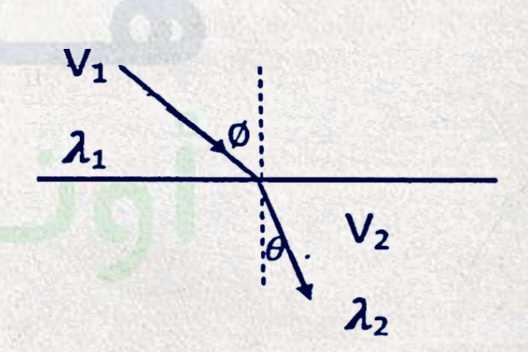
2

Main Point

When light ray travels from less density medium to dense medium, the velocity of it decrease, then it refracts towards the normal.

$V_1 > V_2 \rightarrow \therefore \sin\phi > \sin\theta \rightarrow (\phi > \theta)$

$\therefore \lambda_1 > \lambda_2$ & ${}_1n_2 > 1$



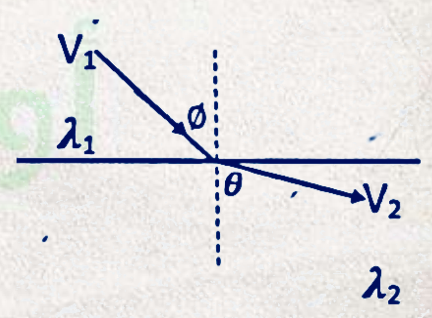


Main Point

When light ray travels from dense medium to less density medium, the velocity of it increase, then it refracts away the normal:

$V_1 < V_2$ → ∴ $\sin \phi < \sin \theta$ → $\phi < \theta$

∴ $\lambda_1 < \lambda_2$ & ${}_1n_2 < 1$



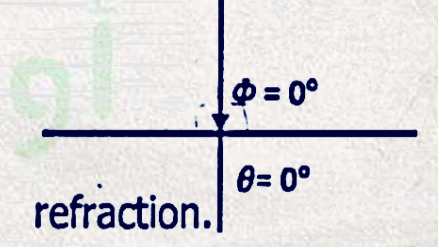
4

Main Point

If the incidence ray is normal to the surface of separation.

$$\phi = 0^o \rightarrow \therefore \left(\sin\theta = \frac{\sin\Phi}{1n2} = \frac{\sin\theta}{1n2} = 0\right) \rightarrow \theta = 0^o$$

It will pass in the same direction of incidence, without refraction.







Main Point

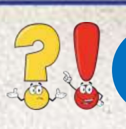
The velocity of light in free space (air) is universal constant and equal to $c = 3 \times 10^8$ m/s which is greater than the velocity of light (V) in any other medium. ($C > V$ usually).



Properties of visible light waves



4 Light Interference



Properties of visible light waves



5 Light Diffraction

Aperture

Screen

R

Airy's disk

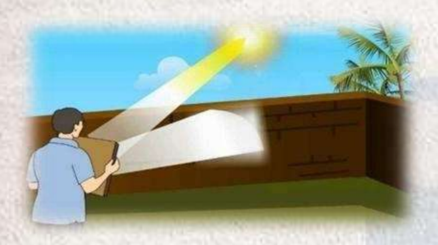
θ

Parallel monochromatic light

First secondary bright spot

Light

Light reflection

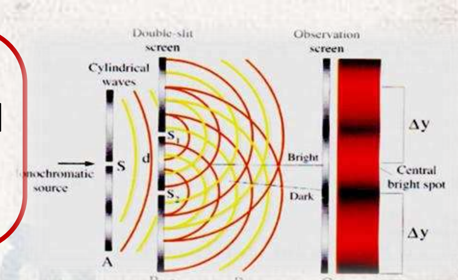


Angle of incidence
=
Angle of reflection

Light interference young's experiment

Distance between two fringes of the same kind

$$\Delta y = \frac{\lambda R}{d}$$

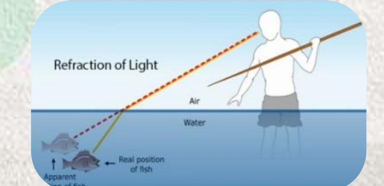


Light refraction

Snell's Law $n_1 \sin\phi = n_2 \sin\theta$

Absolute refractive index for a medium

$$n = \frac{c}{v} = \frac{\sin\phi}{\sin\theta}$$

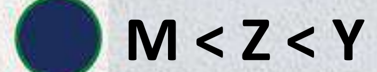


Relative refractive index between two media

$$_1n_2 = \frac{1}{_2n_1} = \frac{n_2}{n_1} = \frac{V_1}{V_2} = \frac{\sin\phi}{\sin\theta}$$



If the opposite table shows some selected wavelenths from the electromagnetic spectrum in air, so ………..

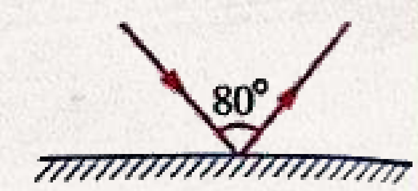


- $M < Z < Y$
- $Y < Z < M$
- $Y < Z = M$
- $Y = Z > M$

	Wavelength
visible light	M
Gamma rays	Y
X-rays	Z



The opposite figure shows a light ray which is falling on the surface of a plane mirror and bouncing back, hence the angle of reflection of the ray from the mirror equals ……………….



- 40°
- 50°
- 80°
- 100°



When a light ray transmits from a less optical dense medium to another optical denser medium with an angle of incidence = zero, which of the following light properties does not change? ………………..

- Speed
- Wavelength
- Direction
- No correct answer



When a light ray falls from air on water surface at an angle of 60°, the angle of refraction will be …………

- greater than 60°
- less than 60°
- equal to 60°
- equal to 0°



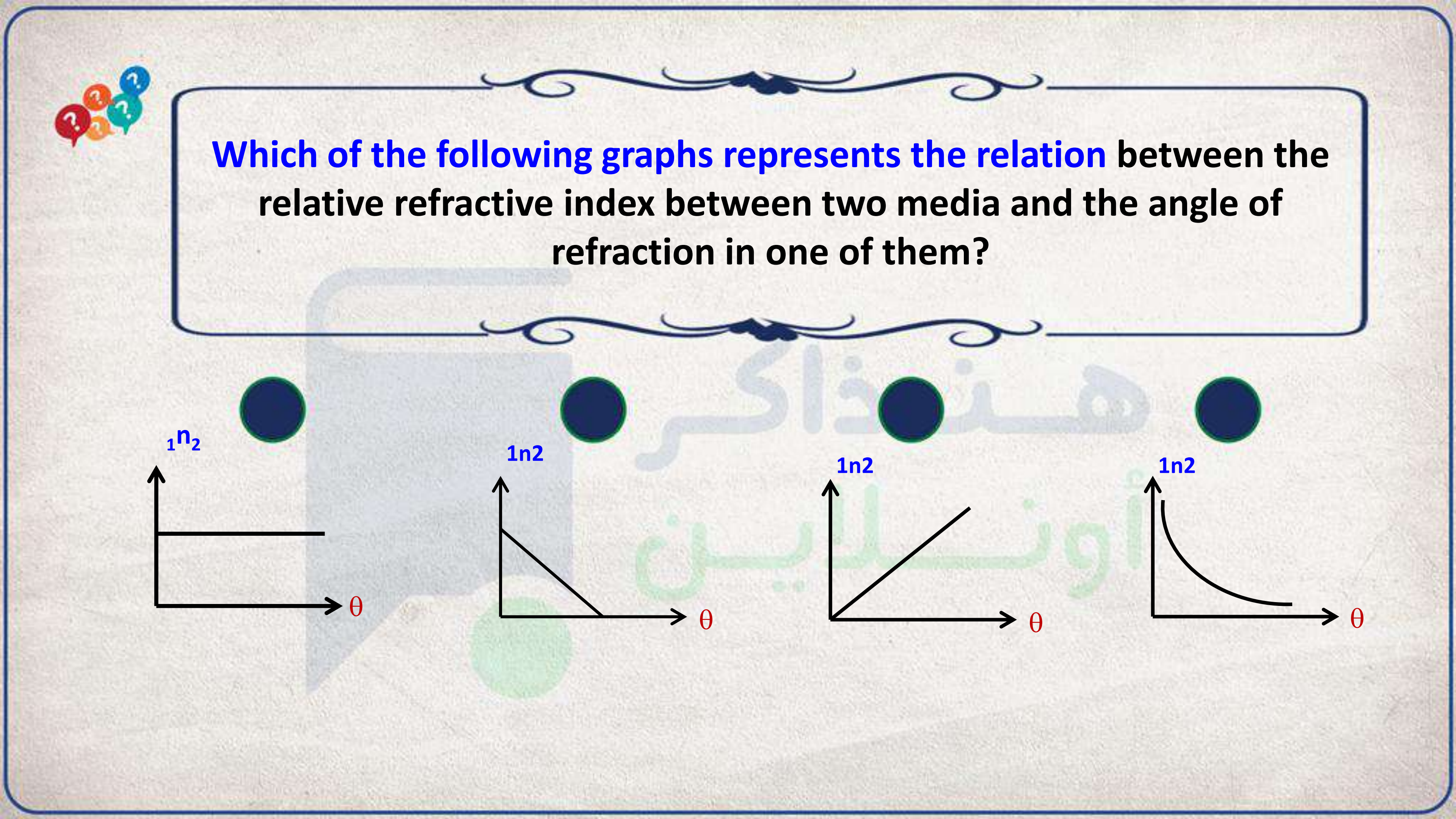
When a light ray falls on the interface between two media at an angle of incidence φ and refracts at an angle of refraction θ, the ratio $\frac{\text{Sin}\Phi}{\text{Sin}\,\theta}$ is ……………….

- constant for the two media
- variable according to the value of
- constant and greater than one
- constant and less than one



When the angle of incidence on the boundary surface between two media doubles, the relative refractive index of them ………….

- decreases to half
- doubles
- remains constant
- increases two times



Which of the following graphs represents the relation between the relative refractive index between two media and the angle of refraction in one of them?
$_1n_2$
θ
1n2
θ
1n2
θ
1n2
θ

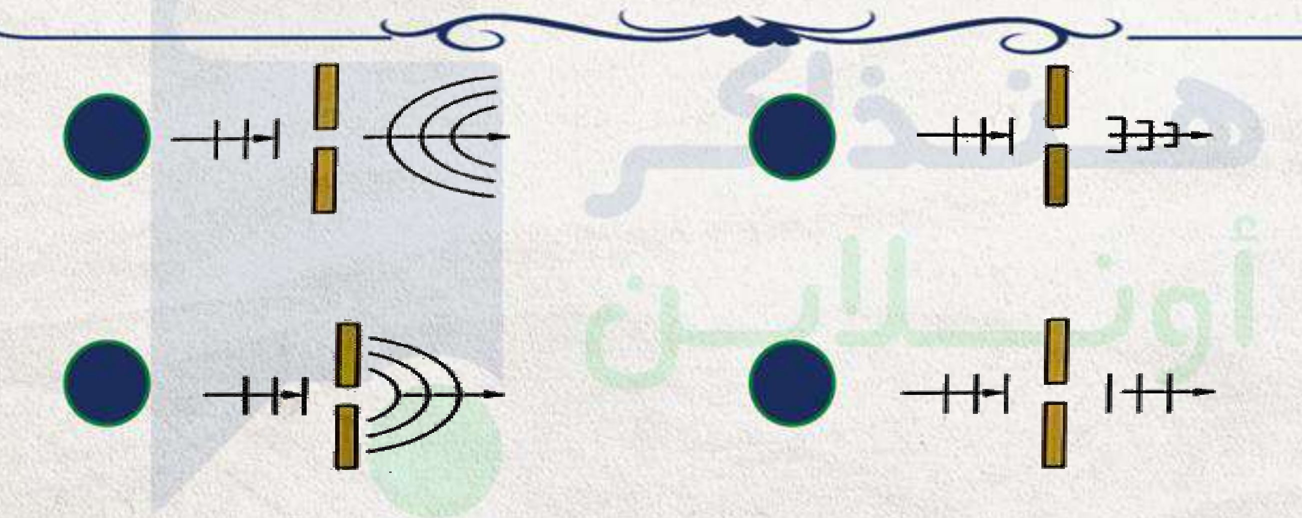


In Young's double –slit experiment, if $R = 10^4\ d$ so ………

- $\Delta y = \lambda$
- $\Delta y = 10^4 \lambda$
- $\Delta y = 10^{-4}$
- $\Delta y = \lambda / 10$



Which of the following **diagrams represents** correctly the phenomenon of light diffraction when light falls on an aperture? ……………





Light waves fall on different aperture of different sizes , so the diffraction of light will be most observable if the aperture size is…………

- 1m
- 10^{-2}m
- 10^{-3} m
- 10^{-5} m



A light ray falls on the separating surface between two media. If the angle between the incident ray and the separating surface is 40^{o} and the angle of refraction in the second medium is 30^{o}. calculate the relative refractive index from the first medium to the second one.



A light ray falls to water with angle 45° . Determine the direction of both the reflected and refracted rays.

(knowing that the refractive index of water is 1.35)



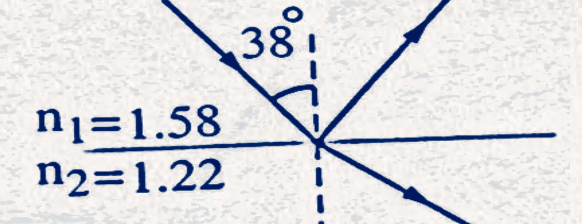
In the double-slit experiment; the distance between the two slits is 0.00015m, the distance between the double-slit screen and the observation screen is 0.75m and the distance between two successive bright fringes is 0.003m.

Calculate the wavelength of the used monochromatic light source.

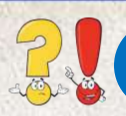


From the opposite figure

Find the value of each of the refraction and reflection angles.

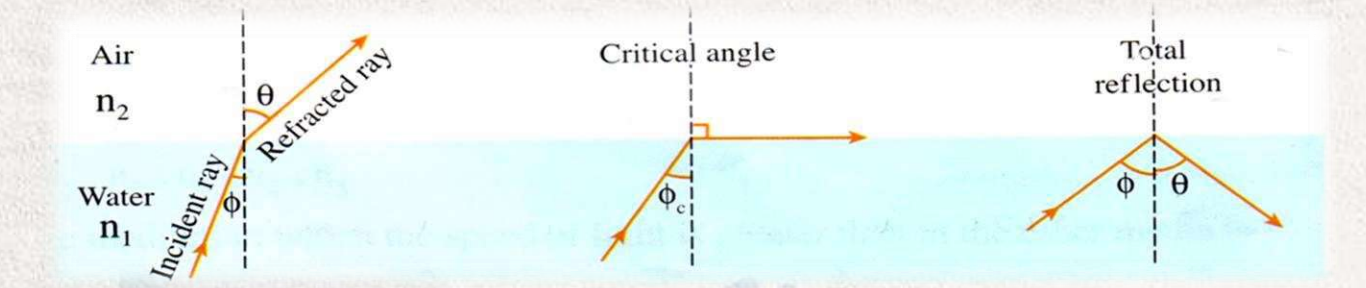



The total reflection & the critical angle



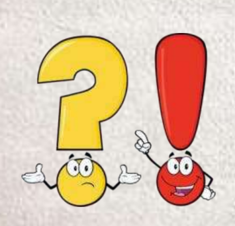
Critical angle between two media





$$\sin \phi_c = {}_{more}n_{less} = \frac{n_{less}}{n_{more}} = \frac{\sin(\phi_c)_{more}}{\sin(\phi_c)_{less}}$$

In case that the less optically dense medium is air:

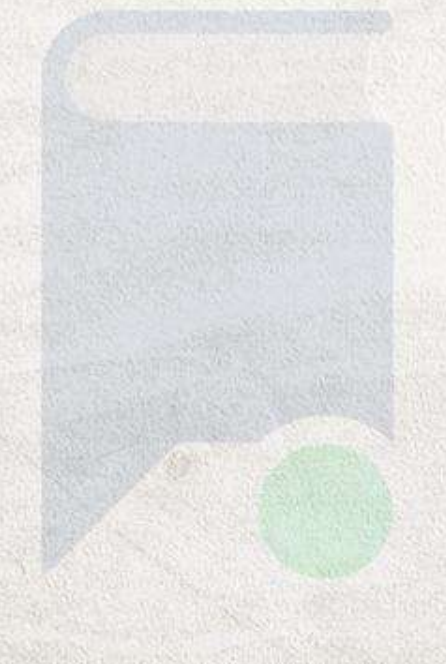


$$\sin \phi_c = \frac{1}{n}$$



Critical angle between two media





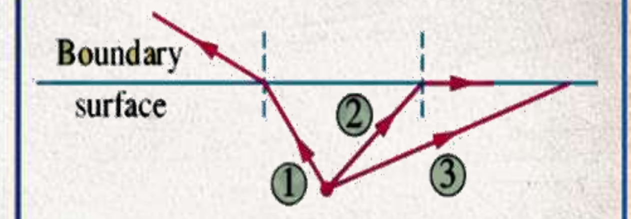


An optical fiber that has a material of refractive index 2.1, is coated by an external layer, so the refractive index of the external layer that makes the critical angle between the two layers equal 32° is ……

- 1.11
- 1.9
- 3.96
- 4.32



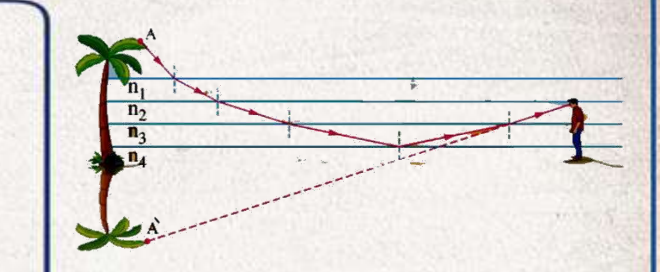
The opposite figure shows a light source that is placed inside a transparent medium. so what happens to ray 3 at the boundary surllwe between the two media?



- It gets reflected because the angle of incidence is less than the critical angle between the two media
- It gets reflected because the angle of incidence is greater than the critical angle befiAeen the two media
- It gets refracted because the angle of incidence is less than the critical angle between the two media
- It gets refracted because the angle of incidence is greater than the critical angle the two media



The opposite figure shows the occurrence of mirage, hence the correct order of refractive indices of air layers is.............



- $n_3 < n_2 < n_1$
- $n_1 < n_2 < n_3$
- $n_2 < n_1 < n_3$
- $n_3 < n_1 < n_2$



If you have two flexible transparent materials where the refractive index of one of them is larger than that of the other material and we want to use them to make an optical fiber, then which of them is used to make the inner core of the optical fiber and which of them is used to make the external layer of it? And why?



The opposite figure shows four light rays that fall on an isosceles triangular prism of refractive index 1.5, so which of these rays changes its direction by 180°?

(1)

(2)

(3)

(4)

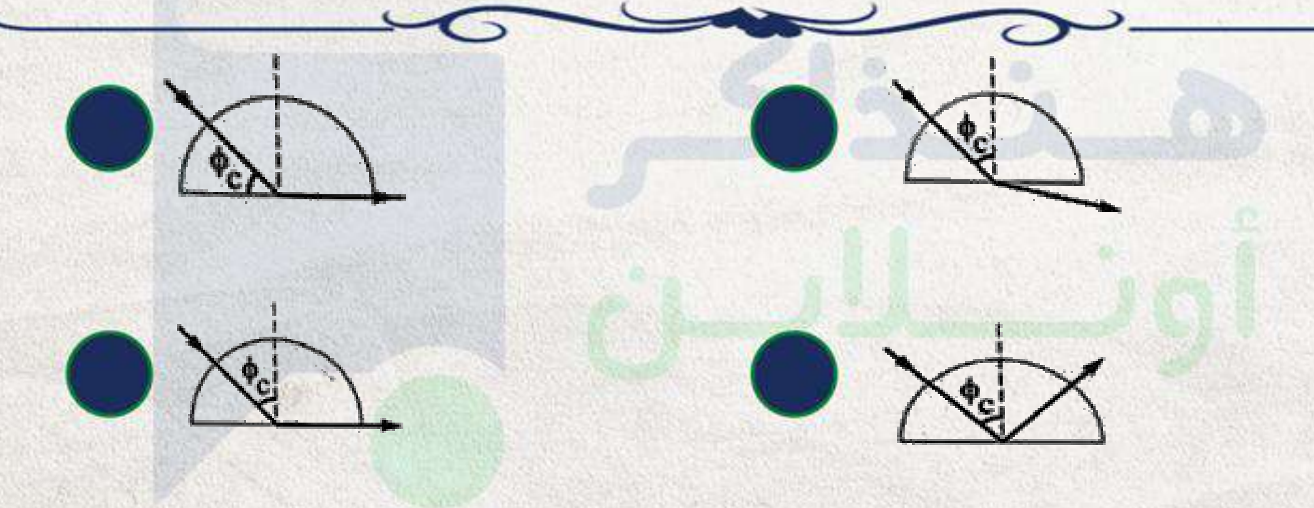


The total internal reflection for an incident light ray from an optically denser medium to an optically less dense medium, occurs when the angle of incidence is ....

- equal to 90°
- bigger than the critical angle
- equal to the critical angle
- less than the critical angle



figure ………………….. Represent the correct path of incident light ray on a semi- circular disc of glass with an angle of incidence equal the critical angle (ϕ_c)




هنذاكر
أونلاين

Normal Prism

Angle of deviation

$\alpha = \phi_1 + \theta_2 - A$



Apex angle

$A = \theta_1 + \phi_2$



If

light ray falls normally

$\phi_1 = \theta_1 = 0^o$

$A = \phi_2$

$\alpha = \theta_2 - \phi_2$

Emergent ray is tangent

$\theta_2 = 90^o$

$\phi_2 = \phi_c$

$A = \theta_1 + \phi_c$

$\alpha = \phi_1 + 90 - A$

Emergent ray is normal

$\phi_2 = \theta_2 = 0^o$

$A = \theta_1$

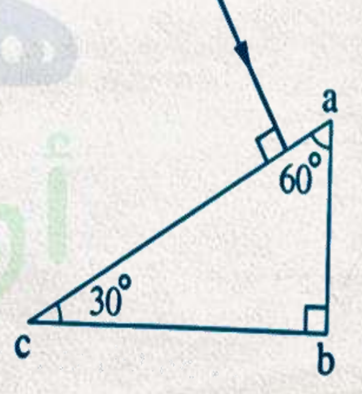
$\alpha = \phi_1 - \theta_1$

Position of minimum deviation			
Angle of incidence and refraction in the second medium	Refractive index of prism	Angle of deviation	Angles of incidence and refraction in the first medium
$\theta_1 = \phi_2 = \theta_o = \frac{A}{2}$	$n = \frac{\sin\left(\frac{\alpha_o + A}{2}\right)}{\sin\left(\frac{A}{2}\right)}$	$\alpha_o = 2\phi_1 - A$ $= 2\theta_2 - A$ $= 2\phi_o - A$	$\phi_1 = \theta_2 = \phi_o = \frac{\alpha_o + A}{2}$



Light ray falls perpendicular one side of a triangular prism of refractive index 1.5 as shown in figure.

1. **Trace the path of the light ray inside the prism**



2. **Find its angle of emergence**



A light ray falls on a side of an equilateral triangular prism by angle 45° . Its refractive index is $\sqrt{2}$, calculate the angle of emergence and angle of deviation of the ray



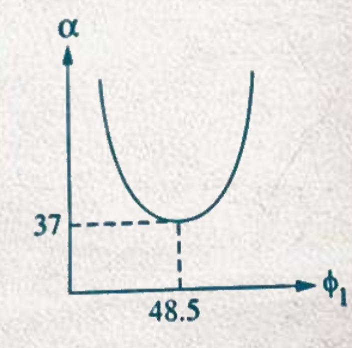
The angle of a triangular prism is 45° if a ray of light falls perpendicular on one side then it emerges as tangent to the other side. Calculate the refractive index of the prism material



The opposite graph:

Represents the relationship between the incidence angle(ϕ_1) and the deviation angle (α) of a light ray falling on the face of a triangular prism. Using the values shown in the figure, Calculate:

1. **The emergence angle of the ray at point x .**
2. **The apex angle of the prism .**
3. **The refractive index of the prism material .**



Thin Prism

Angle of deviation → $\alpha_o = A\,(n - 1)$

Angular dispersion → $(\alpha_o)_b - (\alpha_o)_r = A\,(n_b - n_r)$

Average deviation → $(\alpha_o)_y = \dfrac{(\alpha_o)_b + (\alpha_o)_r}{2} = A\,(n_y - 1)$

Thin Prism

Dispersive power → $\omega_a = \dfrac{(\alpha_o)_b + (\alpha_o)_r}{(\alpha_o)_y} = \dfrac{n_b - n_r}{n_y - 1}$

Average refractive index → $n_y = \dfrac{n_b + n_r}{2}$

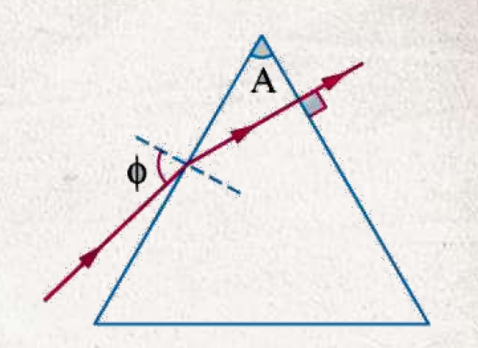


A thin prism of angle 8°, the refractive index of its material to the red and blue colors are 1.52 and 1.54, calculate:

1. The deviation angle for each color
2. The angular dispersion between two colors
3. The dispersive power of the prism



A light ray falls on a triangular prism and emerges normal to the other face as in the opposite figure, so the angle of incidence (ϕ) is.......



- greater than A
- less than A
- equal to A
- there is no relation between it and A



A triangular prism of apex angle 45° and refractive index 1.6 is set on the minimum deviation position, so the angle of incidence of the light ray equals ....

- 13.8°
- 17.3°
- 30.5°
- 37.8°



The factor (s) that affect the angle of deviation of the light ray in a triangular prism is (are)………

- the apex angle of the prism
- the angle of incidence of the light ray
- the refractive index of the prism
- all the previous

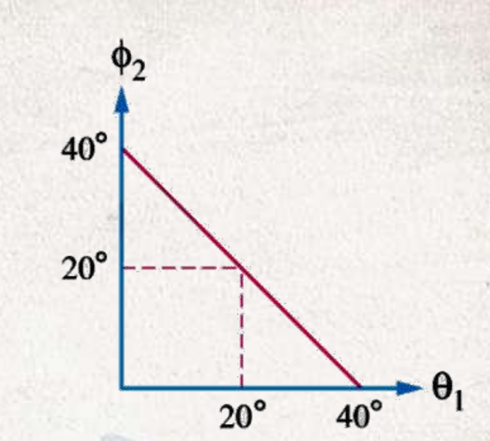


A triangular prism of apex angle 45° and refractive index 1.66 is submerged in a liquid of refractive index 1.33. If the prism is in the minimum deviation position. the angle of deviation of light in the prism in this case equals ………

- 9.29°
- 12.06°
- 16.19°
- 33.88°



The opposite graph represents the relation between the first angle of refraction (θ_1) and the second angle of incidence (ϕ_2) when a light ray passes through a triangular prism. If the critical angle of the prism material is 41.8°, then the angle of minimum deviation for the falling light ray is …….



- 17.27°
- 21.73°
- 25.46°
- 30.25°



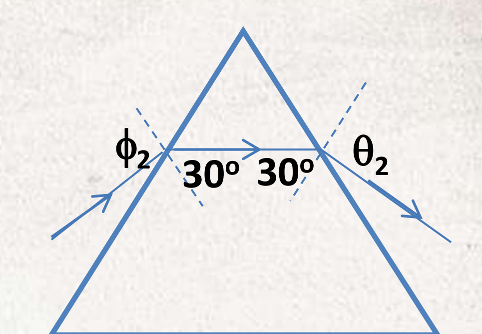
In the opposite figure, the apex angle of the triangular prism is ....



- 30°
- 60°
- 70°
- 90°



In the opposite figure shows a triangular prism where a light ray falls on its face at an angle (θ_1) and emerges from the other face at an angle (θ_2) , so the ratio equals……….



- 1/2
- 1/1
- $1/\sqrt{2}$
- $1/\sqrt{3}$

Laws and solved examples

Volume  **Flow rate**  Mass

Volume of fluid

Flowing in time (1)

$$V_{ol} = Q_v t$$

$$Q_v = Av$$

Mass of fluid

Flowing in time (1)

$$m = Q_m t$$

$$\rho Q_v = \rho Av$$

Continuity equation

For a tube having two cross – sectional areas

$$A_1V_1 = A_2V_2$$

$$r_1^2V_1 = r_2^2V_2$$

For a tube branched into a number of branches

Same cross-sectional area

$$A_1V_1 = \eta A_2V_2$$

$$r_1^2V_1 = \eta r_2^2V_2$$

Different cross-sectional area

$$A_1V_1 = A_2V_2 + A_3V_3 + \dots\dots$$

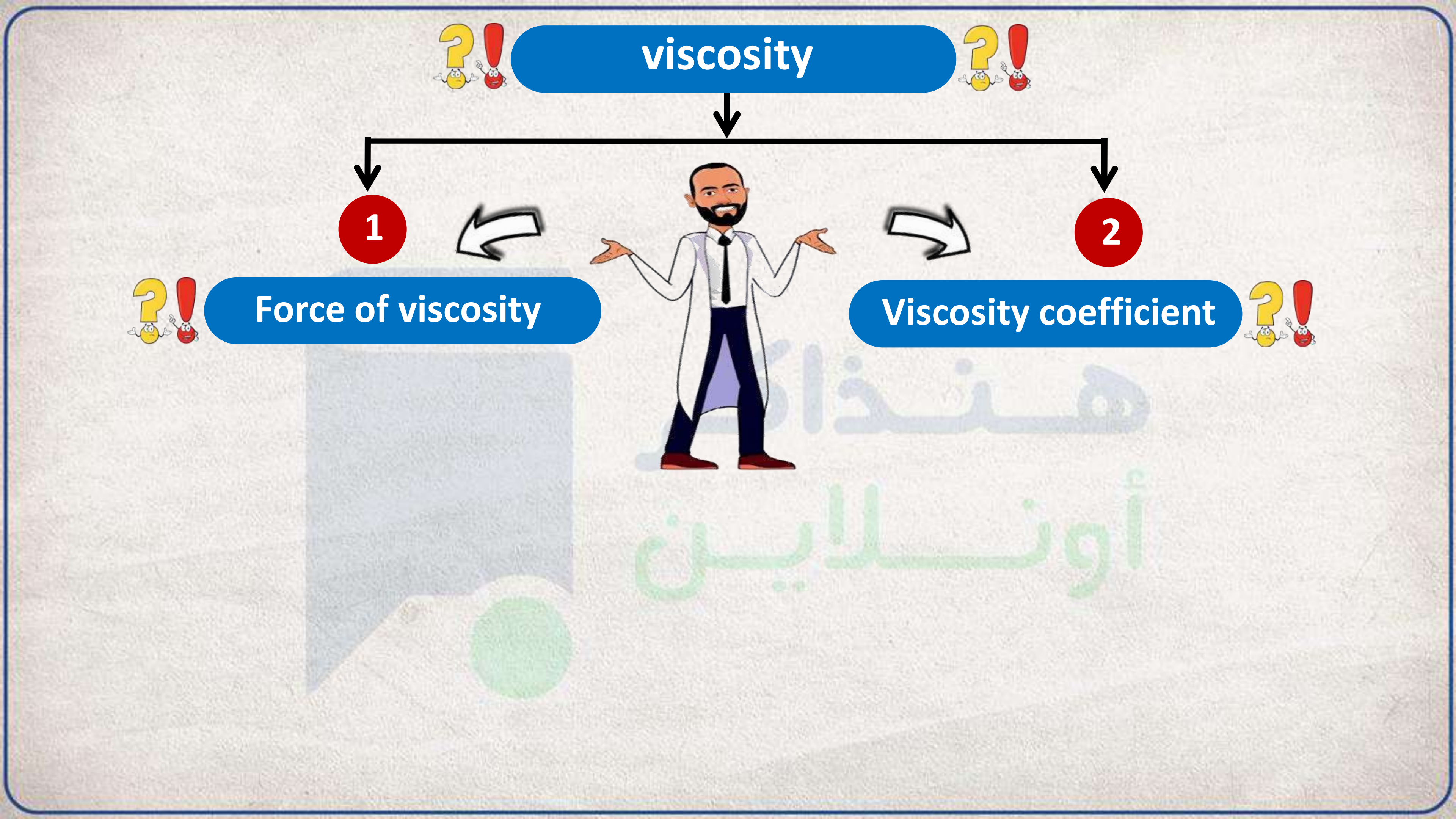
$$r_1^2V_1 = r_2^2V_2 + r_3^2V_3 + \cdots$$



Three water taps, the first fills a tank in one hour and the second fills the same tank in half an hour. While the third fills it in quarter an hour. Calculate the time required to fill the tank if the three taps are opened at the same time.



A major artery, the speed of blood in the main artery is 0.08 m/s and it branches into 150 blood capillaries. If the radius of each is 1/8 the radius of the main artery. Calculate the speed of blood in each capillary


viscosity
1
Force of viscosity
2
Viscosity coefficient



A plate of area 0.01 m^2 moves in a speed of 12.5 cm/s parallel to another static plate and isolated from it with a layer of liquid of thickness 2 mm, if the viscosity coefficient of the liquid is 4 kg/m.s.

Calculate the required force to keep the plate moving



In the steady **flow of liquid**, the ratio between the number of streamlines passing in the wide part of a tube to that in the narrow part of the same **tube is …….**

- greater than one
- less than one
- equal to one
- indeterminable



In the steady flow, when the cross-sectional area of the tube decreases, the density of the streamlines ……..

- Increases
- Decreases
- Vanishes
- Remains unchanged



If the cross-sectional area of tube increases to the double in the steady flow, the volume flow rate …….

- Increases to the double
- Decreases to the half
- Remains constant
- Decreases to the quarter



A water pipe of cross-sectional area $4cm^2$ at the ground floor and $2\ cm^2$ at the upper floor. If the water is flowing steadily such that its speed at the ground floor was 2m/s, then (Where: the water density = 1000 kg/cm^3)

The flow speed at the upper floor is …….

- 1 m/s
- 2 m/s
- 3 m/s
- 4 m/s



A water pipe of cross-sectional area $4cm^2$ at the ground floor and $2\ cm^2$ at the upper floor. If the water is flowing steadily such that its speed at the ground floor was 2m/s, then (Where: the water density = 1000 kg/cm^3)

The volume flow rate of water at the ground floor equals …………

- $4 \times 10^{-4}\ m^3/s$
- $6 \times 10^{-4}\ m^3/s$
- $8 \times 10^{-4}\ m^3/s$
- $12 \times 10^{-4}\ m^3/s$



A water pipe of cross-sectional area $4 cm^2$ at the ground floor and $2 cm^2$ at the upper floor. If the water is flowing steadily such that its speed at the ground floor was 2m/s, then (Where: the water density = $1000 kg/cm^3$)

The mass flow where rate of water at the upper floor equals …………

- 1.2 kg/s
- 0.8 kg/s
- 0.6 kg/s
- 0.4 kg/s



The ratio between the mass flow rate and the volume flow rate for a liquid which flows steadily equals ………

- The cross-sectional of the tube
- The time of liquid flow
- The speed of liquid flow
- The liquid density

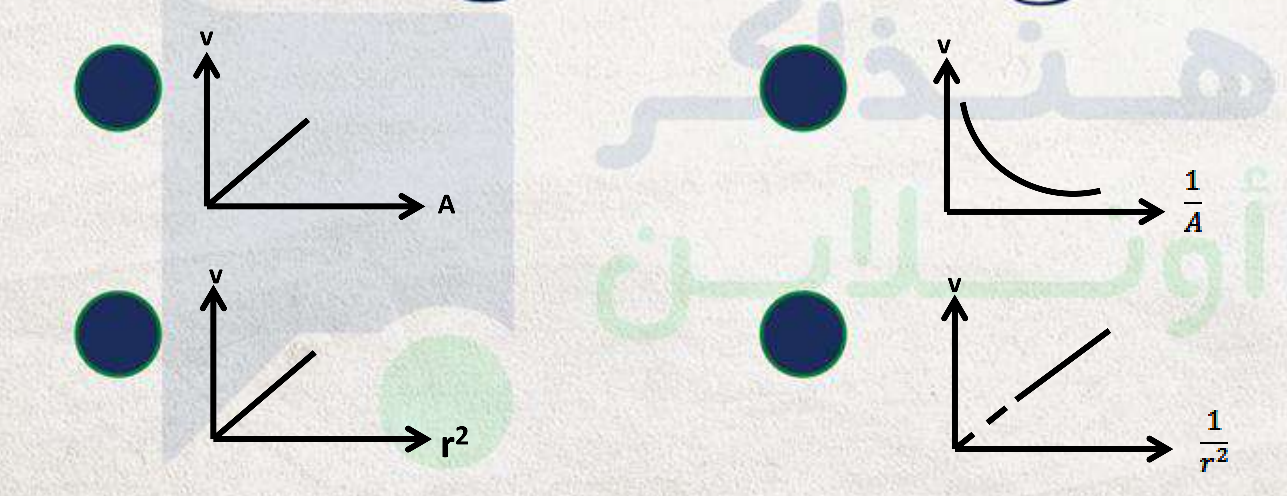


Water is rushing through a pump opening cross-sectional area $5cm^2$ at a speed of 12m/s, so the mass of the water coming out from the pump within 30 minutes is ....

- 18.2×10^3 kg
- 15.1×10^3 kg
- 10.8×10^3 kg
- 8.6×10^3 kg

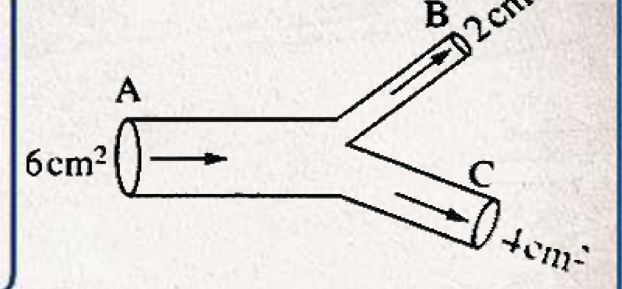


The continuity equation is represented by graph ....





In the opposite figure, the speed of the steady flow of water at A and C is 8 m/s and 4 m/s respectively, then its speed at B is …….



- 16 m/s
- 12 m/s
- 8 m/s
- 6 m/s



When the temperature of a liquid decrease. Its viscosity coefficient …

- Increases
- Decreases
- Does not change
- Cannot be determined without knowing the type of liquid



In the relatively low or medium speeds of a car, the air resistance due to its viscosity is ……

- Directly proportional to square the speed of the car
- Directly proportional to the speed of the car
- Inversely proportional to square the speed of the car
- Inversely proportional to the speed of the car.



In the high speeds of a car, the air resistance due to its viscosity is ……

- Directly proportional to the speed of the car
- Inversely proportional to the speed of the car
- Directly proportional to square the speed of the car
- Inversely proportional to square the speed of the car .



Final exam
Senior 2
يوسف الأشرف
PHYSICS
TEACHER

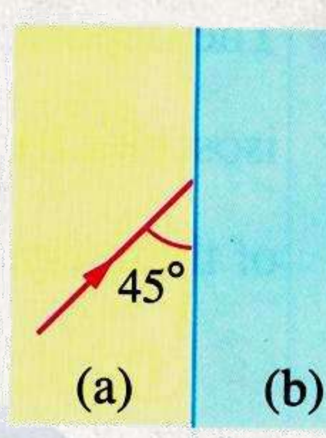


Which of the following is affected in the light wave when it is diffracted?

- Its frequency
- Its wavelength
- Its velocity
- Its propagation direction



In the opposite figure, a light ray falls from medium (a) at angle 45° on the separating surface with medium (b), where it deviates from its original path by an angle of 45°, so the relative refractive index between the two media ($_bn_a$) equals



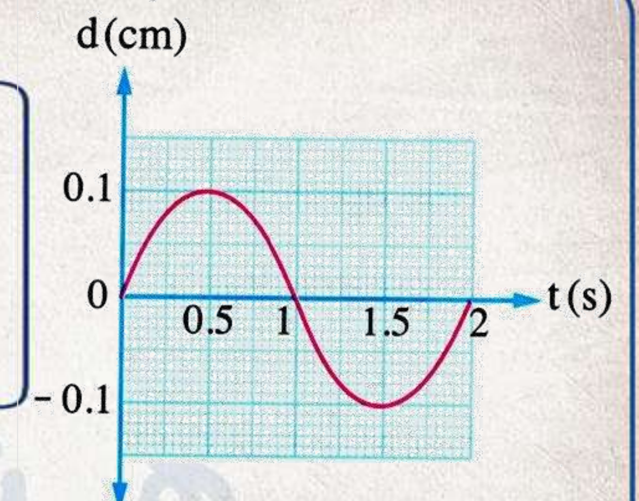
- 

- 

- $\frac{1}{\sqrt{2}}$
- $\frac{2}{\sqrt{3}}$



The opposite (displacement-time) graph represents a body that moves a simple harmonic motion, so.......



 a

 b

 c

 d

	The amplitude (cm)	The frequency (Hz)
a	0.1	4
b	0.05	2
c	0.1	0.5
d	0.05	0.25



A layer of a viscous liquid of thickness 3 cm and viscosity coefficient 1.2 kg/m.s is confined between two horizontal parallel plates. If a tangential force of 1.6 N acts on the upper plate to move it with a uniform speed of 1 m/s, then the area of the upper plate equals...........

- $0.02\ m^2$
- $0.03\ m^2$
- $0.04\ m^2$
- $0.05\ m^2$



We don't hear the sound of explosions that happen in the Sun, because ……………….

- the location of the explosions is very far
- the sound propagates as transverse waves
- the sound propagates as electromagnetic waves
- the sound propagates as mechanical waves

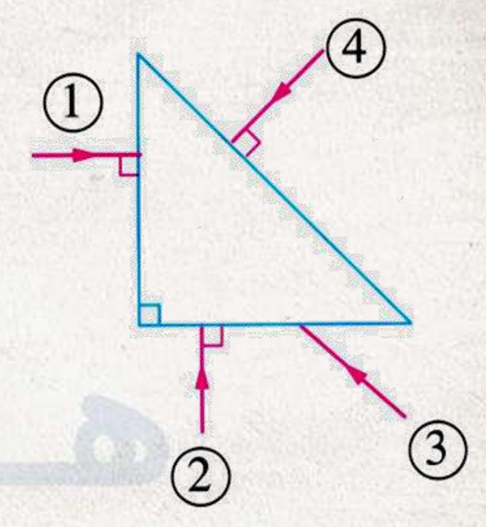


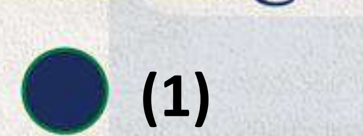
If the angle of minimum deviation for a light ray that falls on one of the faces of an equilateral triangular prism is 60° , the refractive index of the prism material for the incident light equals...........

- $\sqrt{2}$
- 1.5
- 1.6
- $\sqrt{3}$



The opposite figure shows four light rays that fall on an isosceles triangular prism of refractive index 1.5, so which of these rays changes its direction by 180°?






(1)

(2)

(3)

(4)



If red and blue light rays fall with the same angle of incidence ϕ on the separating surface from the optically rarer medium to an optically denser medium, then the ratio between the angle of refraction of red light and the angle of refraction of blue light $\left(\frac{\theta_r}{\theta_b}\right)$ in the optically denser medium is......

- greater than 1
- less than 1
- equal to 1
- indeterminable



The cross-sectional areas of the two ends of a tube are 0.005 m^2 and 0.01 m^2 . If water flows through the tube steadily and the volume of the flowing water within 15 minutes is 9 m^3 , then the speed of the water in……………..


a


b


c

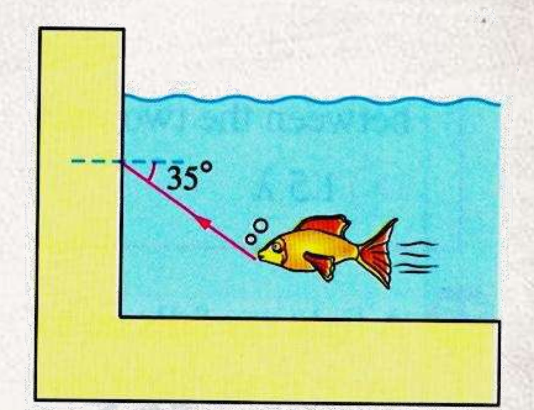
d

	The wide cross-section	The narrow cross-section
a	0.6 m/s	1.5 m/s
b	1 m/s	1.5 m/s
c	0.6 m/s	2 m/s
d	1 m/s	2 m/s





A plastic transparent plate of refractive index 1.5 is used to make an aquarium. If a light ray gets reflected from a fish inside the water and falls on the plastic plate at an angle of incidence 35° as in the opposite figure, therefore the emergence angle of the light ray to the air equals…………



- 30.57°
- 35.41°
- 49.72°
- 52.33°

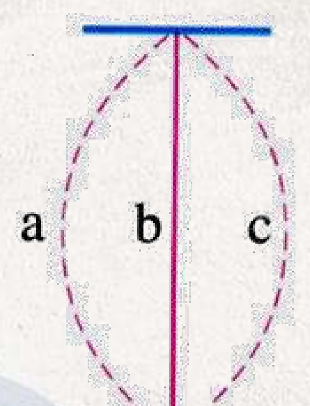


In Young's double-slit experiment, a light ray falls on the double-slit where the distance between the two slits is 0.19 mm and they are 90 cm away from the observation screen. If the distance between the central fringe and the first bright fringe is 3×10^{-3} m, so the wavelength of the used light is………

- **490 nm**
- **520 nm**
- **603 nm**
- **633 nm**



The opposite figure represents the motion of a vibrating string, so the velocity of the string is **maximum at ………**



- point a
- point b
- points b and c
- points a and c



Four identical solid balls are dropped from the same height into four cylinders, each of them contains the same volume of different liquid while the time taken by each ball to reach the bottom of the cylinder is recorded as the following table:……..





Cylinder 3

Cylinder 4

Cylinder	Time
1	0.2 s
2	0.3 s
3	0.6 s
4	1 s



When a light of wavelength is used in Young's double-slit experiment, the path difference between the two interfered waves at the central fringe is equal to…………

- **1.5 λ**
- **λ**
- **0.5λ**
- **0**



A light ray falls on a mirror making an angle of 60° with its surface, therefore the reflection angle of the light ray from the mirror is equal to

- 60°
- 30°
- 90°
- 120°



A blue light source is immersed under the surface of water at a certain depth to form blue light circular spot on the surface of water. If the blue light source is replaced by a red light source, then the light spot at the water surface ……………..

- vanishes
- decreases in area
- keeps its area
- increases in area



If the ratio between the apex angles of two thin prisms of the same material equals 2/5 then the ratio between the dispersive powers of them respectively equals ……………….

- **1 /1**
- **2/5**
- **5/2**
- **2/3**

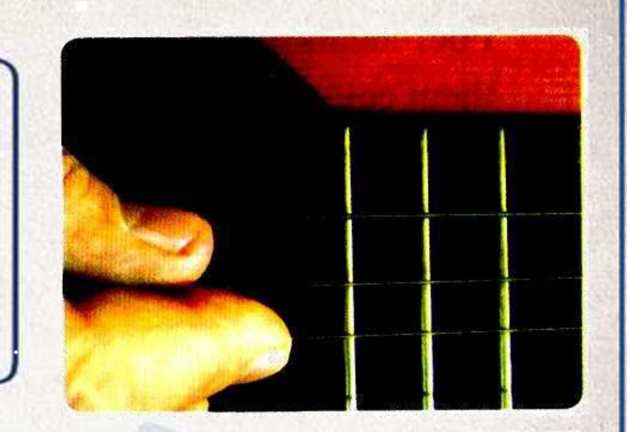


If the volume flow rate of a liquid is Q_v in a pipe that is branched into four branches of equal cross-sectional areas, then the flow rate in each branch equals ………………

- $4\ Q_v$
- $1/3\ Q_v$
- Q_v
- $1/4\ Q_v$



In the opposite figure, a tone of frequency **5000 Hz** is produced due to the vibration of a guitar string, then the periodic time of the vibrating string in ms equals ……..



- 2×10^{-4}
- 5×10^{-4}
- 0.2
- 0.5



If a light ray falls on one of the faces of a triangular prism of apex angle 40° with an angle of incidence of 60° to emerge normally from the other face, then the refractive index of the prism equals …………

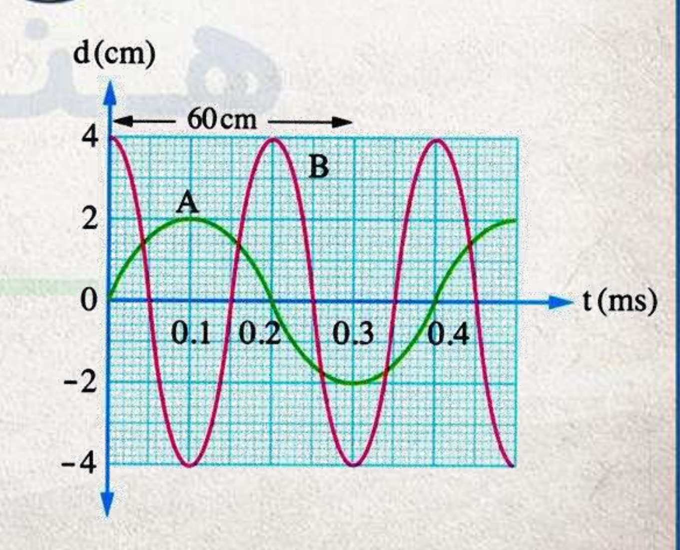
- **1.5**
- **1.41**
- **1.35**
- **0.71**

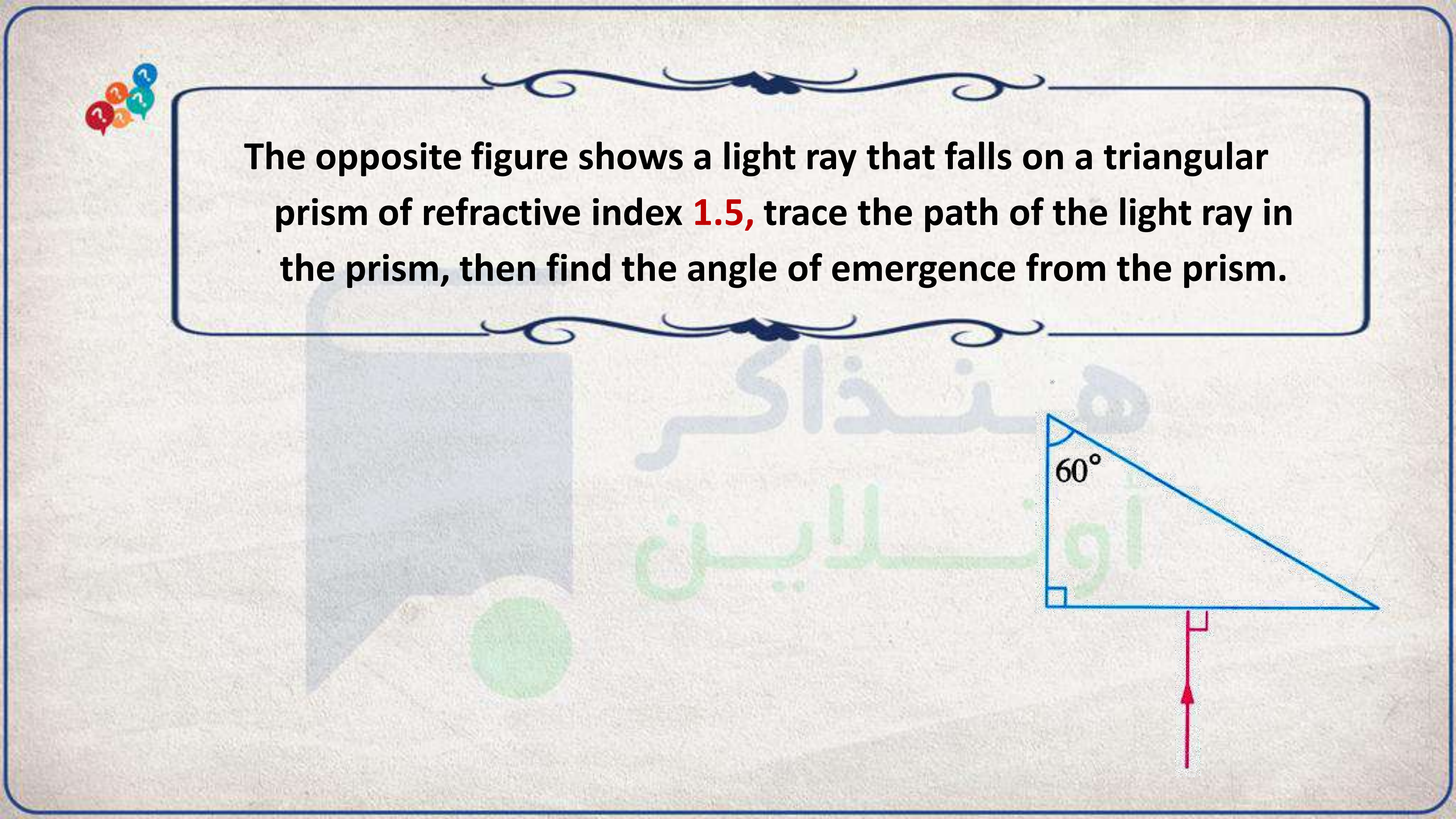


People in the high floors feel wind speed more than those in the lower floors: Explain why?



The opposite graph shows the relation between the displacement (d) and the time (t) for two waves A and B, find the speed of propagation of each wave in the medium.





The opposite figure shows a light ray that falls on a triangular prism of refractive index 1.5, trace the path of the light ray in the prism, then find the angle of emergence from the prism.
60°



كيفية طباعة صفحات معينة من ملف معين



مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9

خطوة 1

خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي – ثم نكتب 9

خطوة 4
اختيار نوع الورق

خطوة 5
اختيار A4

خطوة 6

Important laws

1- frequency $(\upsilon) = \frac{n}{t} = \frac{1}{T} = \frac{1}{4\times t_A} = \frac{V}{\lambda}$

2- Periodic time (T) $= \frac{t}{n} = \frac{1}{\upsilon} = 4\times t_A = \frac{\lambda}{V}$

3- Wavelength $(\lambda) = \frac{\text{Total distance (X)}}{\text{Number of waves (n)}} = \frac{V}{\upsilon}$

4- $V = \lambda \cdot \upsilon$

5- $\frac{\lambda_1}{\lambda_2} = \frac{\upsilon_2}{\upsilon_1}$ & $\frac{\lambda_1}{\lambda_2} = \frac{V_1}{V_2} = \frac{n_2}{n_1}$

6- ${}_1n_2 = \frac{\sin\varphi}{\sin\Theta} = \frac{V_1}{V_2} = \frac{n_2}{n_1} = \frac{1}{{}_2n_1} = \frac{\lambda_1}{\lambda_2}$

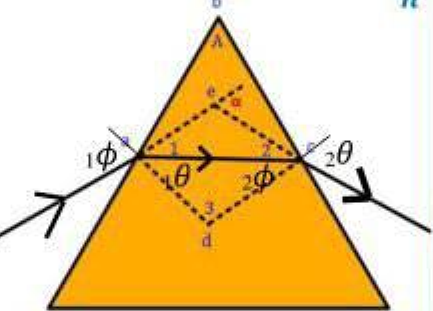
7- snell's law $(n_1 \sin\varphi = n_2 \sin\Theta)$

8- The distance between two successive fringes of the same kind $(\Delta y = \frac{\lambda R}{d})$, $(\Delta y = \frac{x}{n})$

9- $\sin\phi_c = \frac{n_2\ (less)}{n_1\ (high)} = {}_1n_2 = \frac{\sin\varphi_{c1}}{\sin\varphi_{c2}}$

When the less dense medium is air then: $\sin\phi_c = \frac{1}{n}$

Normal prism



10- $A = \Theta_1 + \phi_2$

11- $\alpha = (\phi_1 + \Theta_2) - A$

12- $n = \frac{\sin\phi_1}{\sin\theta_1} = \frac{\sin\theta_2}{\sin\phi_2}$

At the minimum angle of deviation:

13- $\varphi_o = \frac{\alpha_o + A}{2}$ & $\Theta_o = \frac{A}{2}$

14- $n = \frac{\sin(\frac{\alpha_o + A}{2})}{\sin(\frac{A}{2})}$

The thin prism

15- $\alpha_o = A(n-1)$

16- angular dispersion = $(\alpha_o)_b - (\alpha_o)_r = A(n_b - n_r)$

17- $n_y = \frac{n_b + n_r}{2}$

18- $(\alpha_o)_y = \frac{(\alpha_o)b + (\alpha_o)r}{2} = A(n_y - 1)$

*If the thin prism immersed in a liquid then

$\alpha_o = A(\frac{n_{prism}}{n_{liquid}} - 1)$

19- $\omega_\alpha = \frac{(n_b - n_r)}{(n_y - 1)}$

Chapter 4: Hydrodynamics

20- $Q_v = \frac{V_{ol}}{t} = AV$

21- $Q_m = \frac{\Delta m}{\Delta t} = \rho A V = \rho Q_v$

22- $A_1 V_1 = A_2 V_2$

$\therefore \frac{V_1}{V_2} = \frac{A_2}{A_1} = \frac{r_2^2}{r_1^2} = \frac{D_2^2}{D_1^2}$

*The tube is branched into (n) branches of the same area.

$A_1 V_1 = n A_2 V_2$ & $r_1^2 V_1 = n r_2^2 V_2$

* The tube is branched into (n) branches of different area.

*$A_1 V_1 = A_2 V_2 + A_3 V_3 + A_4 V_4$

*$r_1^2 V_1 = r_2^2 V_2 + r_3^2 V_3 + r_4^2 V_4$

viscosity

23- $F = \eta_{vs} \frac{AV}{d}$

24- $\eta_{vs} = \frac{Fd}{AV}$

*The measuring unit of viscosity coefficient:

$N.s/m^2$, $J.s/m^3$, Kg/m.s, Pascal.Sec.

*Conversions

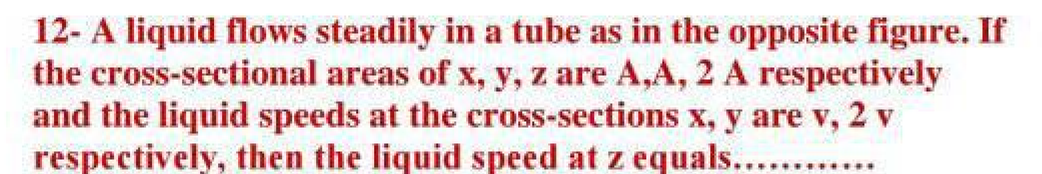
Cm ⟶ m $\times 10^{-2}$

mm ⟶ m $\times 10^{-3}$

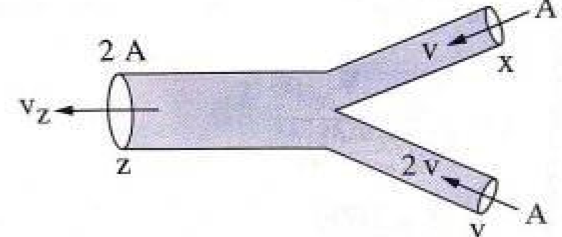
cm^2 ⟶ m^2 $\times 10^{-4}$

cm^3 ⟶ m^3 $\times 10^{-6}$

Angstrom = 10^{-10} m



12- A liquid flows steadily in a tube as in the opposite figure. If the cross-sectional areas of x, y, z are A,A, 2 A respectively and the liquid speeds at the cross-sections x, y are v, 2 v respectively, then the liquid speed at z equals…………



a) 2 v   b) $\frac{2}{3}$ v

c) $\frac{3}{2}$ v   d) v

13- The average speed of blood in one of the arteries of an adult person is 0.33 m/s. If the radius of that artery is 0.7 cm and it distributes blood to 30 smaller arteries each of radius 0.35 cm, then the average blood speed inside these small arteries equals…………..

a) 0.011 m/s   b) 0.022 m/s

c) 0.033 m/s   d) 0.044 m/s

14- In steady flow, when the cross-sectional area of the tube decreases, the density of streamlines ……....

a) increases   b) decreases but doesn't reach zero

c) vanishes   d) remains unchanged

15- The continuity equation of liquid flow can be deduced from the law of conservation of…………

a) mass   b) energy

c) momentum   d) density

16- If the cross-sectional area of a tube in which a liquid flows steadily gets increased to the double, then the volume flow rate……….

a) increases to the double   b) decreases to its half

c) remains constant   d) decreases to its quarter

17- Water flows steadily in a tube of diameter 2 cm at a speed of 5 m/s. Thus;

(i) The volume of water which is flowing through the cross-section of the tube in one minute equals……..

a) 9.42 m^3 b) 0.19 m^3

c) 0.0942 m^3 b) 0.001 m^3

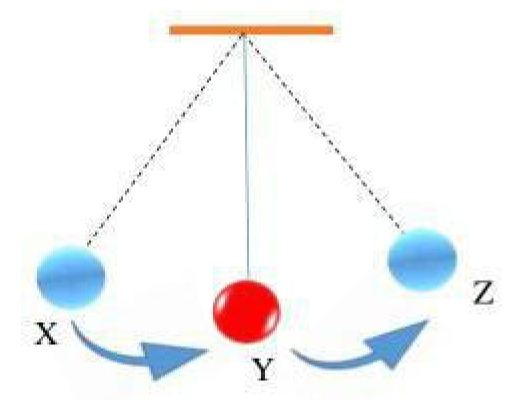
(ii) The time required to fill a tank of volume 20m^3 by using the flowing water from the tube is……..

a) 127.38 minutes   b) 212.31 minutes

c) 3.54 minutes   d) 2.123 minutes

Choose the correct answer

1- In the opposite figure: If the time taken by the pendulum to move from X to Z is 0.8 s, calculate:



(a) The periodic time.

(b) The frequency.

(c) The number of complete oscillations through 16 s.

(d) The time required to make 50 oscillations.

2- A sound wave of frequency 512 Hz travels from air to water. If the speed of sound in air is 340 m/s and in water is 1360 m/s, so the frequency of the wave in water equals……………..

a) 128 Hz b) 256 Hz

c) 512 Hz d) 2048 Hz

3- If a vibrating object takes 0.1 s to complete one oscillation, then the number of complete oscillations that is made by the object during 100 s equals.......... oscillations.

a) 10 b) 100

c) 1000 d) 10000

3- Sound waves travel in gases as……………

a) longitudinal waves b) transverse waves

c) longitudinal and transverse waves d) electromagnetic waves

4- In the opposite wave, which of the points a, b, c, d have the same phase?

a) a,b,c b) a,b

c) b.c d) b.d

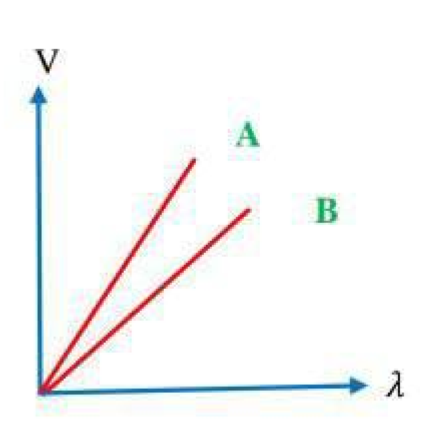


5- If the time interval between the pass of the first crest and the tenth crest by a point in the path of a wave motion is 0.2s then the frequency is…………….

a) 45 Hz b) 50 Hz

c) 55 Hz d) 60 Hz

6- The opposite graph shows the relation between the speed and the wavelength for two different waves of the same type (A and B) when they propagate through many different media, so………..





a) $v_A > v_B$ b) $v_A < v_B$



c) $\lambda_A = \lambda_B$ d) $\lambda_A > \lambda_B$

7- If the speed of water waves that pass by a certain point is 1.5 m/s and there are 30 waves pass by this point in 1 s, then the number of waves in a distance of 60 m equals…………

a) 3 waves b) 40 waves

c) 400 waves d) 1200 waves

8- If the terminal of a spring is being moved to make a transverse wave of wavelength 30 cm and periodic time 0.1 s, then the terminal of the spring is being moved to make a longitudinal wave of periodic time 0.2 s which has the same speed as the transverse wave, so the wavelength of the longitudinal wave equals..................

a) 7.5 cm b) 15 cm

c) 30 cm d) 60 cm

9- A wave of frequency υ_1 and wavelength λ_1, propagates in a medium with speed v_1, if this wave travels from this medium to another medium where its speed becomes $\frac{2}{3}v_1$, then ……………

a) the frequency υ_1 remains constant and the wavelength becomes $\frac{3}{2}\lambda_1$

b) the frequency υ_1, remains constant and the wavelength becomes $\frac{2}{3}\lambda_1$

c) the wavelength λ_1 remains constant and the frequency becomes $\frac{3}{2}\upsilon_1$

d) the wavelength λ_1 remains constant and the frequency becomes $\frac{2}{3}\upsilon_1$

10- The opposite figure shows a wave which is travelling through medium x then it moves to another medium y, so the ratio between the speed of the wave in medium x to its speed in medium y ($\frac{V_x}{V_y}$) is …………..

Boundary

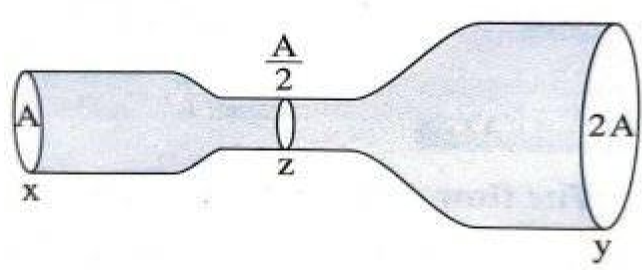
x

y

a) greater than one b) less than one

c) one d) indeterminable

11- The opposite figure shows a liquid flowing steadily in a tube from one terminal to the other, so the ratio of the numbers of streamlines through the cross-sections x : y : z is..............

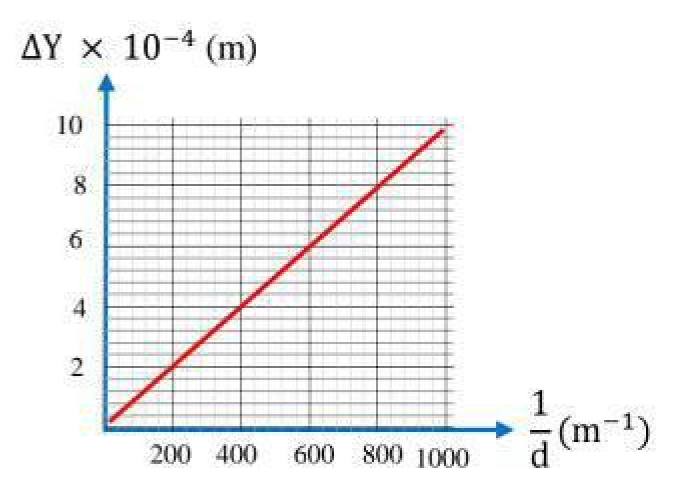




a) 2 : 1 : 4 b) 1 : 2 : 4

c) 2 : 4 : 1 d) 1 : 1 : 1

38- The opposite graph represents the variation of the distance between two bright consecutive fringes (Δy) versus the reciprocal of the distance between the double slits ($\frac{1}{d}$), if the distance between the double slit and the observation screen is 2 m, then the wavelength of the used light equals………….





a) 5×10^{-3} m   b) 2×10^{-6} m

c) 10^{-6} m   d) 5×10^{-7} m

39- It is difficult to observe light diffraction in daily life because of…………..

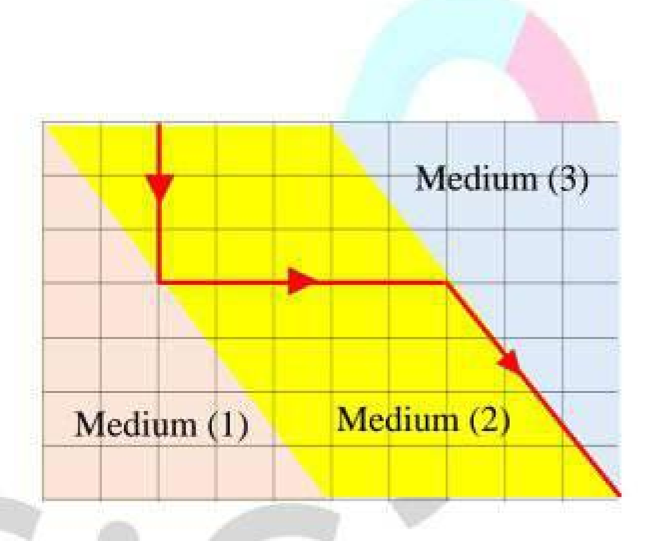
a) the high speed of visible light

b) the small frequencies of visible light

c) the short wavelengths of visible light

d) the high intensity of visible light

40- The opposite figure shows three transparent media(1) , (2) and (3), so if a light ray passes as shown in the figure, what will be the correct order of light speeds through these three media?



a) $V_1 > V_2 > V_3$ b) $V_1 > V_3 > V_2$

c) $V_2 > V_3 > V_1$ d) $V_3 > V_2 > V_1$

41- The critical angle between two media depends on............

a) the absolute refractive index of the optically denser medium only

b) the absolute refractive index of the optically rarer medium only

c) the absolute refractive indices of the two media

d) the angle of incidence of the light ray on the boundary surface between the two media

42- The opposite figure represents a light ray that is incident at an angle of 45° on one of the faces of an equilateral triangular prism whose refractive index equals 1.5, so:

45°



(i) The angle at which the ray emerges from the prism equals ……



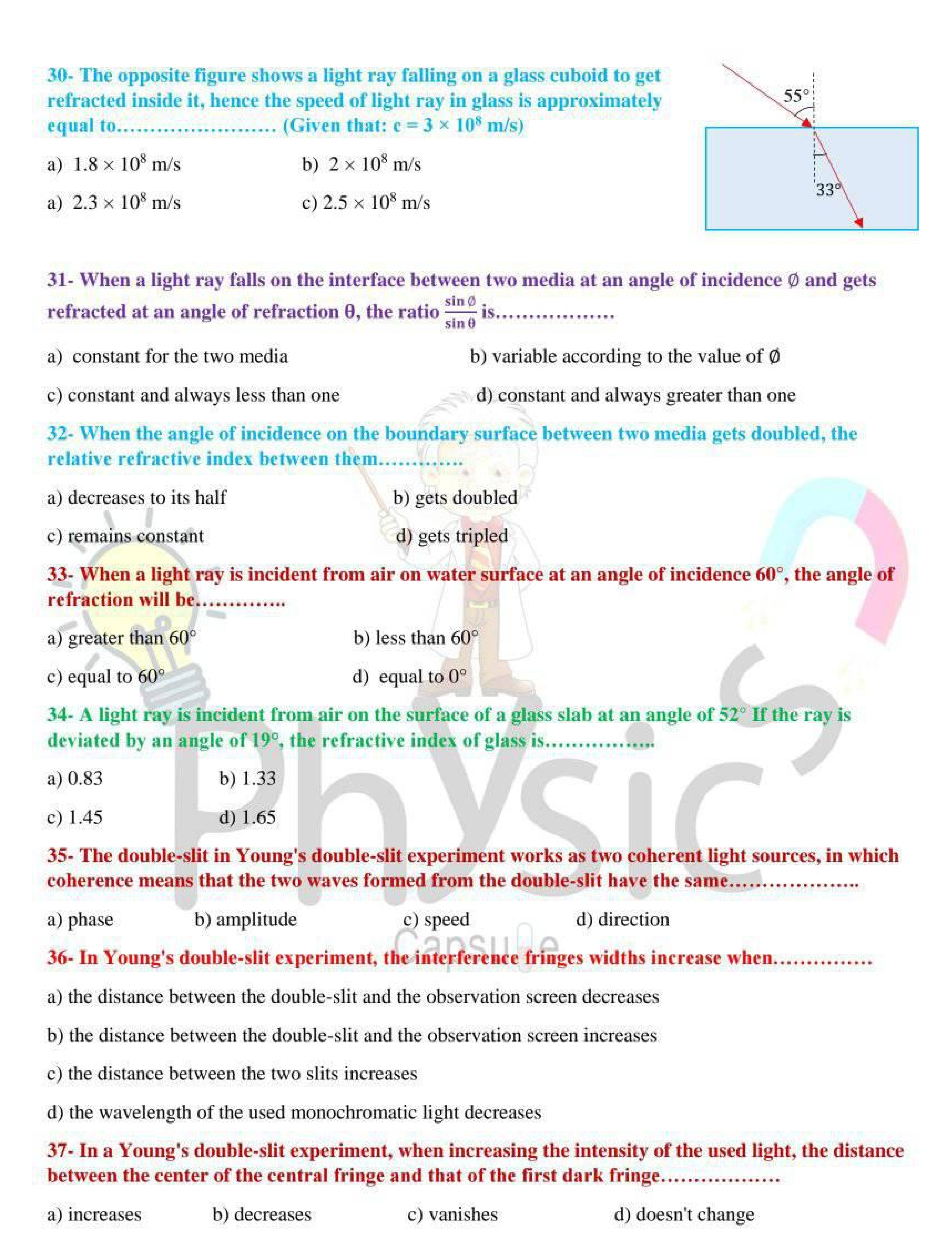
a) 28.13°   b) 31.87°

c) 42.12°   d) 52.37°



(ii) The angle of deviation for the light ray equals…………

a) 37.37°   b) 41.43°   c) 52.63°   d) 67.37°



30- The opposite figure shows a light ray falling on a glass cuboid to get refracted inside it, hence the speed of light ray in glass is approximately equal to…………………… (Given that: $c = 3 \times 10^8$ m/s)

a) 1.8×10^8 m/s b) 2×10^8 m/s

a) 2.3×10^8 m/s c) 2.5×10^8 m/s

31- When a light ray falls on the interface between two media at an angle of incidence ∅ and gets refracted at an angle of refraction θ, the ratio $\frac{\sin \emptyset}{\sin \theta}$ is………………

a) constant for the two media b) variable according to the value of ∅

c) constant and always less than one d) constant and always greater than one

32- When the angle of incidence on the boundary surface between two media gets doubled, the relative refractive index between them………….

a) decreases to its half b) gets doubled

c) remains constant d) gets tripled

33- When a light ray is incident from air on water surface at an angle of incidence 60°, the angle of refraction will be…………..

a) greater than 60° b) less than 60°

c) equal to 60° d) equal to 0°

34- A light ray is incident from air on the surface of a glass slab at an angle of 52° If the ray is deviated by an angle of 19°, the refractive index of glass is……………..

a) 0.83 b) 1.33

c) 1.45 d) 1.65

35- The double-slit in Young's double-slit experiment works as two coherent light sources, in which coherence means that the two waves formed from the double-slit have the same………………..

a) phase b) amplitude c) speed d) direction

36- In Young's double-slit experiment, the interference fringes widths increase when……………

a) the distance between the double-slit and the observation screen decreases

b) the distance between the double-slit and the observation screen increases

c) the distance between the two slits increases

d) the wavelength of the used monochromatic light decreases

37- In a Young's double-slit experiment, when increasing the intensity of the used light, the distance between the center of the central fringe and that of the first dark fringe………………

a) increases b) decreases c) vanishes d) doesn't change

25- When a tangential force F acts on a plate of area A placed on another static plate where a layer of liquid of thickness d is in between, the upper plate moves with a uniform velocity v. What is the tangential force that makes the upper plate moves with a constant velocity 2 v under the same conditions?

a) F b) 2 F

c) $\frac{F}{2}$ d) $\frac{F}{4}$

26- At relatively low or medium speeds of a car, the air resistance due to air viscosity is ………..

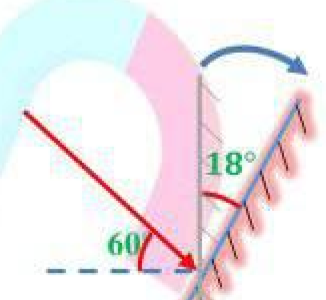
a) directly proportional to the square of the speed of the car

b) directly proportional to the speed of the car

c) inversely proportional to the square of the speed of the car

d) inversely proportional to the speed of the car

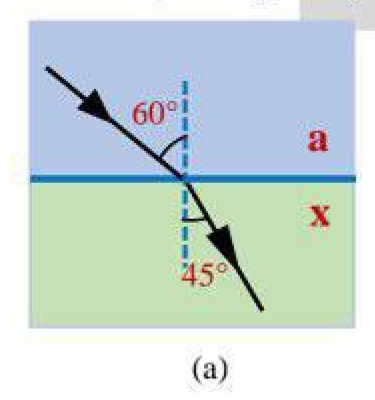
27- A light ray is incident on a plane mirror with an angle of 60°. If the mirror is rotated by an angle of 18° in the clockwise direction while keeping the incident ray in the same direction as in the figure, then the angle of reflection becomes……………



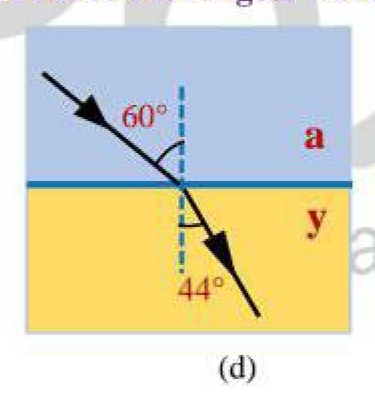
a) 18º b) 42º

c) 48º d) 78º

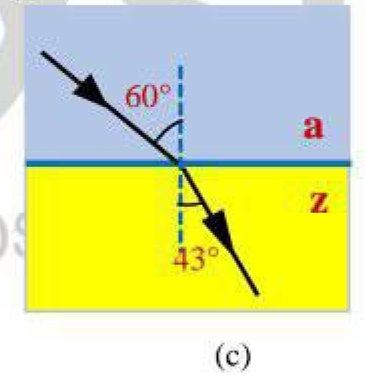
28- The four following figures represent four rays of a light that has a wavelength λ travelling from medium A to other four different media x, y, z and k each one at a time. In which of these media (x, y, z or k) the light ray will have the longest wavelength?



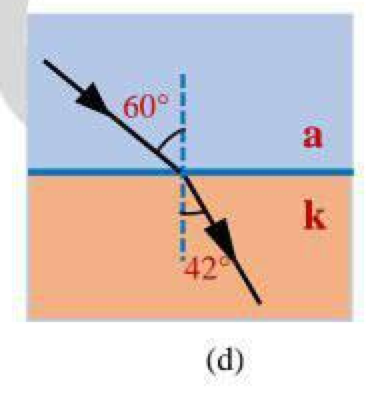
(a)



(d)

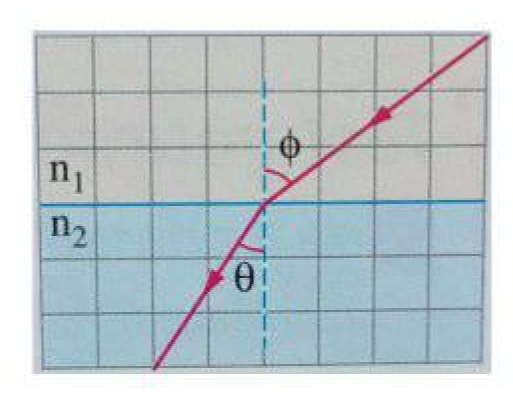


(c)



(d)

29- The opposite figure represents with a definite drawing scale a red light ray while passing between two media, so the relative refractive index between those two media ($_1n_2$) equals……………..



a) 1.44 b) 1.18

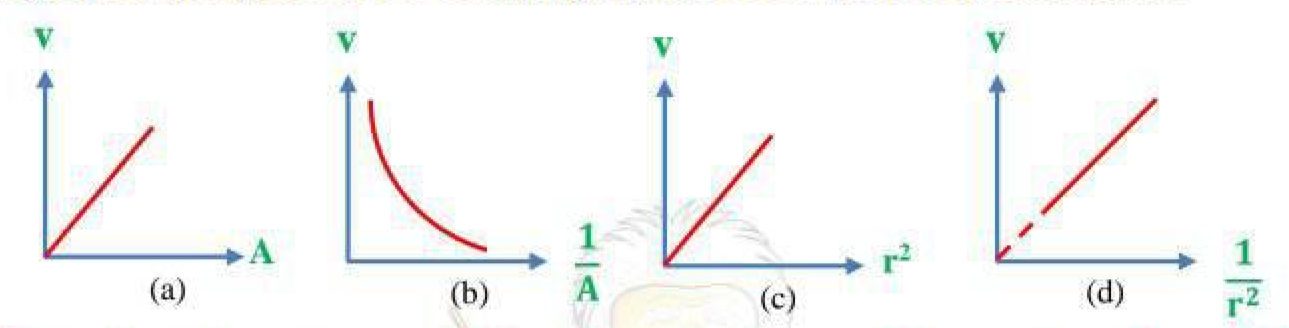
c) 1.13 d) 0.88

18- Water flows steadily through a tube XY such that its speed and its mass flow rate at cross-section X are v, Q_m respectively. If the water speed at cross-section y is $\frac{v}{2}$, then its mass flow rate is equal to……..

a) 2 Q_m b) Q_m

c) $\frac{Q_m}{2}$ d) $\frac{Q_m}{4}$

19- The graph that represents the continuity equation for liquids flow is…………..



20- Oil flows in a tube x at a rate of 6 liters/minute and gets out from another tube y which is connected to the first tube x at a speed of 4 m/s, then the cross-sectional area of the second tube y equals………

a) 1.5×10^{-3} m² b) 1.5 m²

a) 2.5×10^{-5} m² b) 0.025 m²

21- A plane surface of area 0.5 m² moves at a uniform velocity of 2 m/s parallel to another static surface that is separated from it by a layer of liquid of thickness 4 cm, if the viscosity coefficient of the liquid is 1.5 kg/m.s, then the force required to keep the moving with this uniform velocity is…….

a) 37.5 N b) 50 N

c) 67.5 N d) 150 N

22- If the speed difference between two liquid layers gets decreased when a tangential force is acting on the upper layer, then at the same temperature the viscosity coefficient…………..

a) vanishes b) decreases but doesn't vanish c) increases d) remains constant

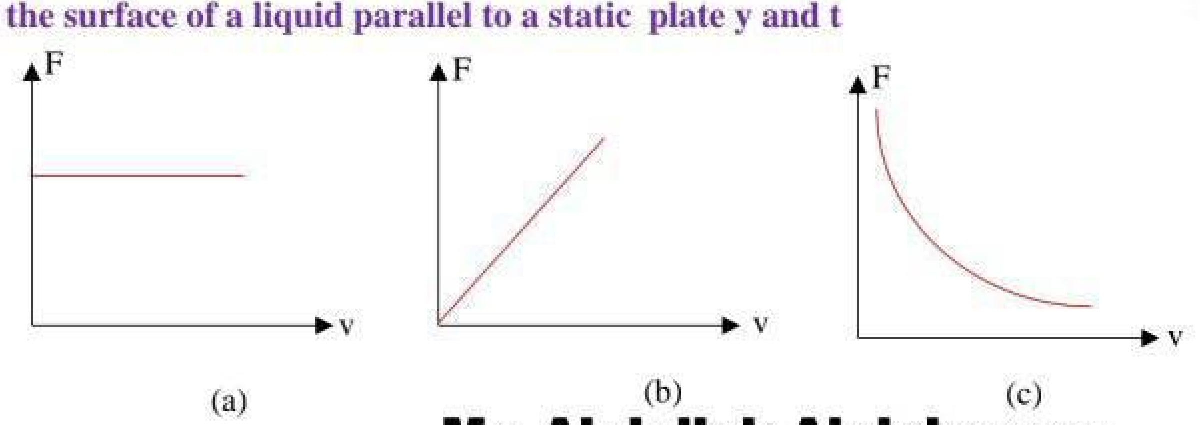
23- When the temperature of a liquid decreases, its viscosity coefficient…………

a) increases b) decreases

c) does not change d) depends on the type of liquid

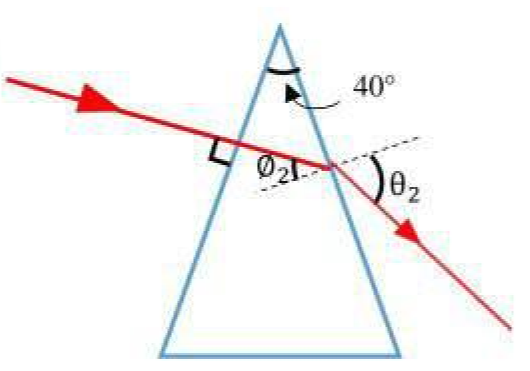
24- Which of the following graphs represents the relation between the force (F) which is required to move plate x with a uniform velocity v on the surface of a liquid parallel to a static plate y and t

x
F
d
v
y
Static plate





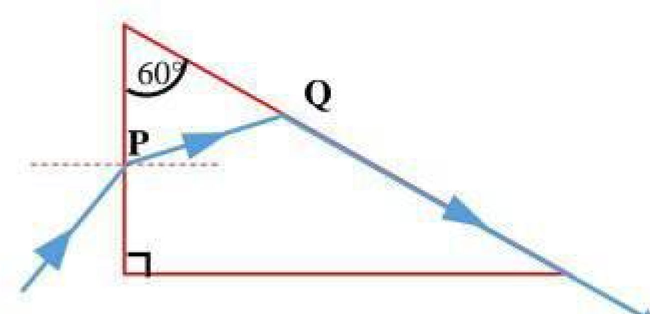
43- The opposite figure shows a light ray which is incident normally on one of the faces of a triangular prism of an apex angle 40°, if $\theta_2 = 1.5\emptyset_2$ the refractive index of the prism equals.........



a) 1.25 b) 1.35

c) 1.51 d) 1.72

44- In the opposite figure, a blue light ray falls on the face of a prism at point P so that the angle of refraction equals 23° then it falls on the opposite face at point Q and emerges tangent to that face, hence:



(i) The critical angle of the prism's material for the blue light equals……………

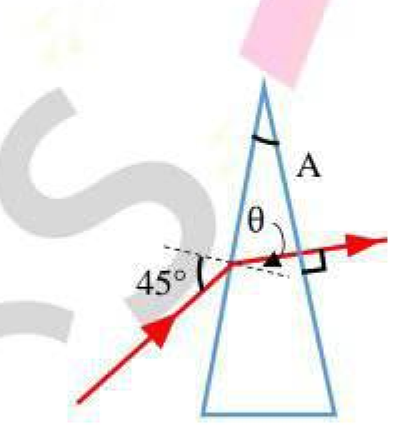
a) 23° b) 37° c) 42° d) 60°

(ii) The refractive index of the prism's material for the blue light equals

a) 1.15 b) 1.41

c) 1.66 d) 1.72

45- In the opposite figure, the apex angle (A) of the prism is…………



a) greater than 45° b) less than 45°

c) equal to 45° d) indeterminable

46- A light ray falls normally on one of the faces of a triangular prism of apex angle 30° If the refractive index of the prism is $\sqrt{2}$ then:

(i) The angle of emergence of the ray from the prism equals…………………

a) 15° b) 30°

c) 45° d) 60°

(ii) The angle of deviation of the ray equals ………….

a) 15° b) 30°

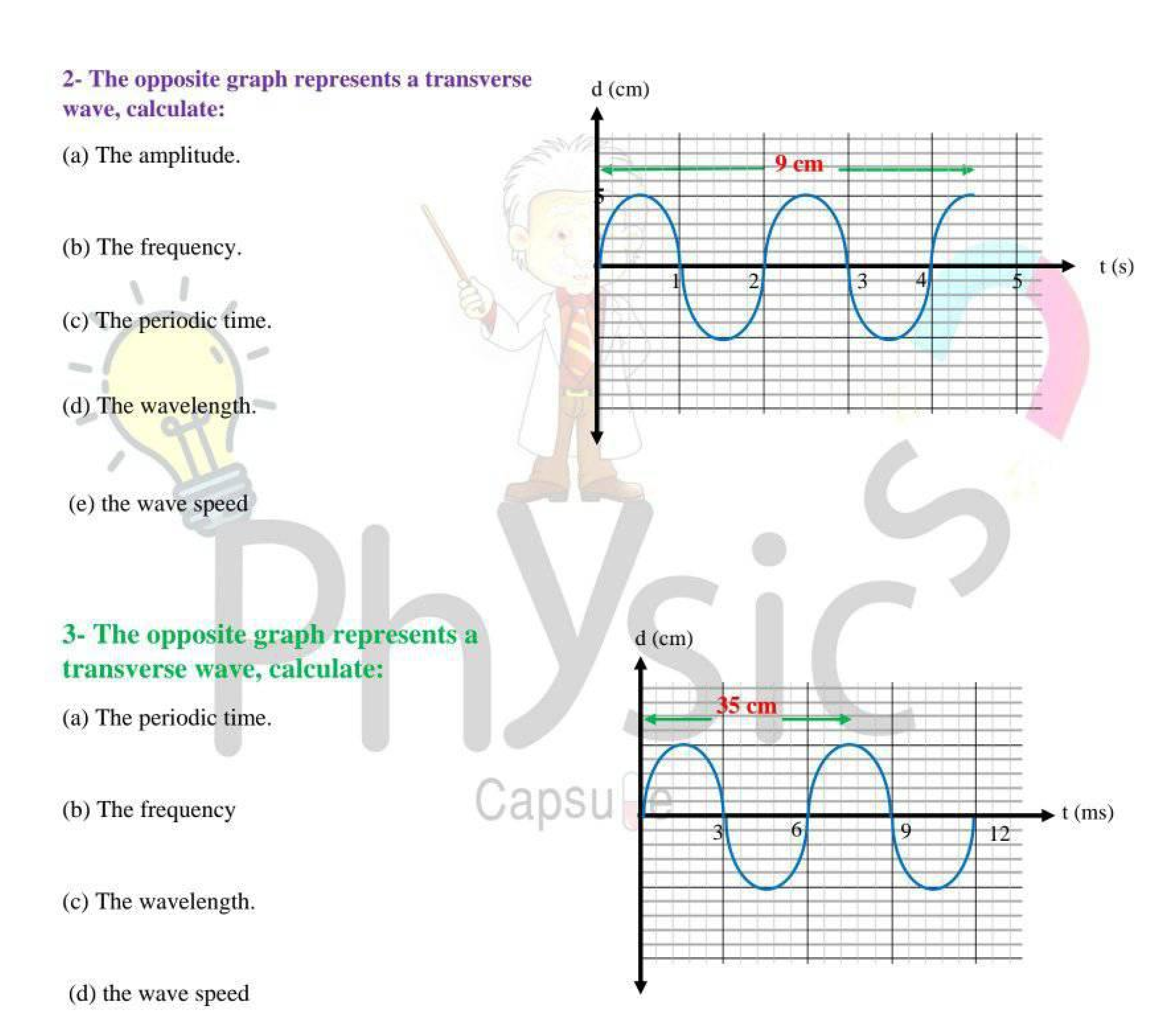
c) 45° d) 60°

47- Two thin prisms x and y are made of the same material, the apex angle of prism x is A and its dispersive power is ω_α so if the apex angle of prism y is 1.5 A, its dispersive power is.............

a) $\frac{\omega_\alpha}{2}$ b) ω_α c) 2 ω_α d) 3 ω_α

Answer the following

1- The opposite figure shows a vibrating string that takes 0.01 s to reach a maximum displacement away from its rest position. Calculate the amplitude and the frequency of the string.



2- The opposite graph represents a transverse wave, calculate:

(a) The amplitude.

(b) The frequency.

(c) The periodic time.

(d) The wavelength.

(e) the wave speed

3- The opposite graph represents a transverse wave, calculate:

(a) The periodic time.

(b) The frequency

(c) The wavelength.

(d) the wave speed

4- If a sound wave travelled from one medium to another and the ratio between its wavelengths in the two media was $\frac{2}{3}$ respectively, what is the ratio between the speeds of sound in the two media respectively?

5- If the ratio between the frequency of a man's sound and that of a girl's sound is $\frac{3}{4}$,what is the ratio between the speeds of the sounds of the man and the girl in air?

6- A water pipe of diameter 2 cm in which water flows with a speed of 0.1 m/s. The pipe enters a house, where its diameter becomes 1 cm. Given that the density of water is 1000 kg/m^3, calculate:

(a) The speed of water in the pipe inside the house.

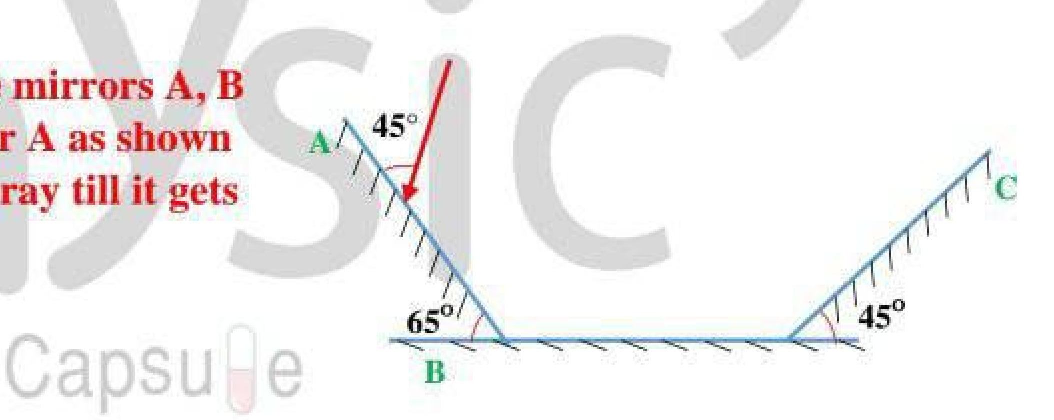
(b) The volume and the mass of the water that flows every minute through any cross- section of the pipe.

7- If the absolute refractive index of water is $\frac{4}{3}$ and the absolute refractive index of glass is $\frac{3}{2}$ calculate:

(a) The relative refractive index from water to glass.

(b) The relative refractive index from glass to water.

8- The opposite figure shows three mirrors A, B and C. If a light ray falls on mirror A as shown in the figure, trace the path of the ray till it gets reflected from mirror C.



9- A light ray falls on the surface of a glass of refractive index 1.5 at an angle of incidence 60°, if a small part of the light gets reflected and another part gets refracted, calculate the angle between the reflected and the refracted light rays.

10- In the double-slit experiment; if the distance between the two narrow rectangular slits was 0.15 mm, the distance between the double-slit barrier and the observation screen was 75 cm and the distance between the centers of two successive bright fringes was 0.3 cm, calculate the wavelength of the used monochromatic light source.

36- A thin prism has an apex angle of 8°, its refractive index for red light is 1.52 and its refractive index for blue light is 1.54. Calculate:

(a) The angle of deviation for each light color.

(b) The angular dispersion for the light in the prism.

(c) The dispersive power of the prism.

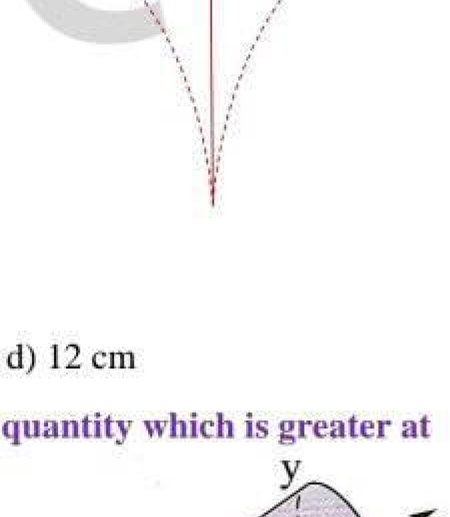


1- In the opposite figure: If the pendulum takes 1 s to move from point X to point Y, so its frequency equals………

a) 0.5 Hz   b) 5 Hz

c) 10 Hz   d) 50 Hz

2- In the opposite figure, a flexible oscillating rod takes time of 0.01 s to move from a to b, then :



(i) Its periodic time............

a) 0.02 s   b) 0.04 s

c) 0.06 s   d) 0.08 s

(ii) Its frequency is……………

a) 1.25 Hz   b) 18.75 Hz

c) 25 Hz   d) 31.25 Hz

(iii) The amplitude of its oscillation is……………

a) 3 cm   b) 6 cm   c) 9 cm   d) 12 cm

3- In the opposite figure, a liquid flows steadily in a tube, so the physical quantity which is greater at cross-section x than at cross-section y is……..

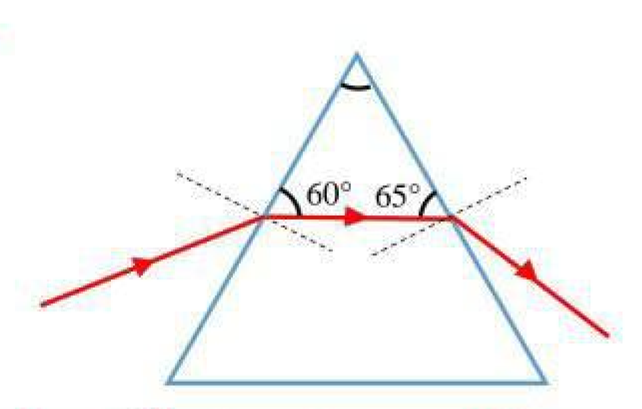
a) the liquid speed

b) the volume of the flowing liquid in unit time

c) the mass of the flowing liquid in unit time

d) the number of the streamlines through the cross-section

17- In the opposite figure, if the refractive index of the prism is 1.5, calculate the deviation angle of the light ray.

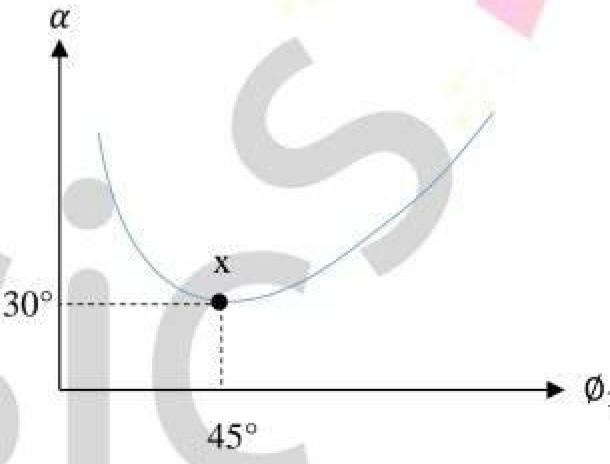


18- A triangular prism is made of a material whose refractive index is $\sqrt{2}$ having an apex angle that equals 60°, calculate:

(a) The minimum angle of deviation in the prism.

(b) The angle of incidence and the angle of emergence at minimum deviation.

19- The opposite graph represents the relation between the angle of deviation (α) for a light ray passing through a triangular prism and the first angle of incidence ($\emptyset_1$) on the face of the prism, calculate:





(a) The apex angle of the prism.

(b) The refractive index of the prism.



(c) The angle of emergence from the prism at point x.

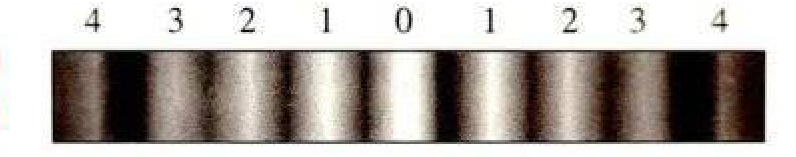
20- A thin prism has an apex angle of 7° and refractive index of 1.5. Calculate the angle of deviation of light in the prism.

21- When a red light ray fell on a thin prism of apex angle A and refractive index n, the ray deviated by an angle of 4°. If the prism has been submerged in a liquid of refractive index 1.2, the angle of deviation becomes 2°, Calculate:

(a) The absolute refractive index of the prism (n).

(b) The apex angle of the prism (A).

11- The opposite figure represents the interference pattern of Young's experiment which was conducted with a light of wavelength 5000 Å and an observation screen at distance 120 cm from the double-slit. If the distance between the central fringe (0) and the fourth bright fringe (4) was 0.8 cm, calculate the distance between the two slits.



12- If the absolute refractive indices of glass and water for a given monochromatic light ray are 1.6 and 1.33 respectively, calculate:

(a) The critical angle for each of them with air.

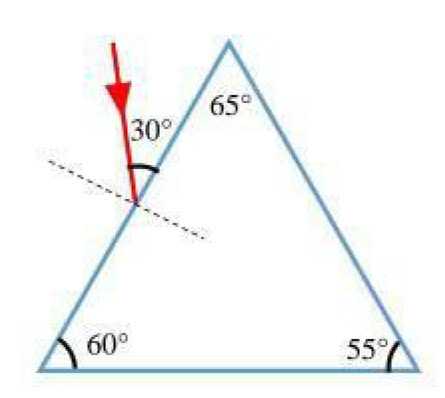
(b) The critical angle for the incident light ray that travels from glass to water.

13- The speeds of propagation of a light wave through two different media (x and y) are 2×10^8 m/s and 2.75×10^8 m/s respectively. Calculate the critical angle between the two media.

14- A piece of diamond was placed at the bottom of a wide basin filled with water for a height of 1 m, calculate the smallest diameter of a cork disk that while floating on the water surface will be enough to block the reflected light by the diamond from emerging out of the water surface. (Giving that: The absolute refractive index of the water = 1.33)

15- A light ray fell from glass on the boundary surface with water, so its wavelength changed from 5000 Å to 5625 Å, calculate the critical angle from glass to water.

16- In the opposite figure, if the refractive index of the prism's material is 1.5:



(a) Trace the light ray inside the prism.

(b) Find the angle of emergence from the prism.

(c) Find the angle of deviation.

29- In the minimum deviation position in prism the sum of apex angle and deviation angle equal……………….

a) Double the refraction angle
b) Double the incidence angle
c) Double the emergence angle
d) b and c

30- The mirage phenomenon is from application of

a) density
b) viscosity
c) the total internal reflection
d) steady flow

31- A light ray fall from air on a triangular prism by angle 65 and emerge normal to the other side then the apex angle …………….65

a) greater than
b) equal
c) less than

32- Oscillating body its frequency is 25Hz so the time of amplitude is ……………… sec.

a) 0.01
b) 0.02
c) 0.04
d) 0.06

33- The opposite figure show the transfer of light between X and Y then…………….

a) ${}_x n_y = \frac{\sin\theta}{\sin\emptyset}$

b) The speed of light in X is greater than Y

c) The speed of light in X is less than Y

d) The medium X has greater optical density than Y

φ
X
Y
θ

34- In the opposite figure a light ray fall perpendicular and emerge by angle 40° then its deviation angle ……………… 40°

a) greater than
b) equal
c) less than

40°

35- The time taken by a pendulum to pass by two points where its speed at one of them is maximum and zero at the other is 0.1s so its frequency equal……………….

a) 2.5 Hz
b) 0.05 Hz
c) 30 Hz
d) 20 Hz

36- A thin prism its apex angle is 6° make a deviation equal 3.6° then its refractive angle is ……

a) 1.5
b) 1.6
c) 1.7
d) 1.8

4- The opposite graph represents the relation between the vertical displacement of one of the medium particles (d) and the time (t) for a wave, then:

(i) The amplitude of that wave is........

a) 9 cm b) 17.5 cm

c) 18 cm d) 35 cm

(ii) The frequency of the wave is.............

a) 1.7 Hz b) 2.5 Hz

c) 3.3 Hz d) 5 Hz



(iii) The wavelength of the wave is.............

a) 0.05 cm b) 17.5 cm

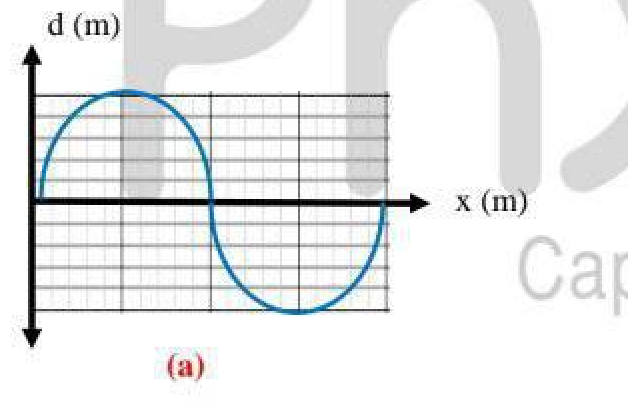
c) 20 cm d) 35 cm

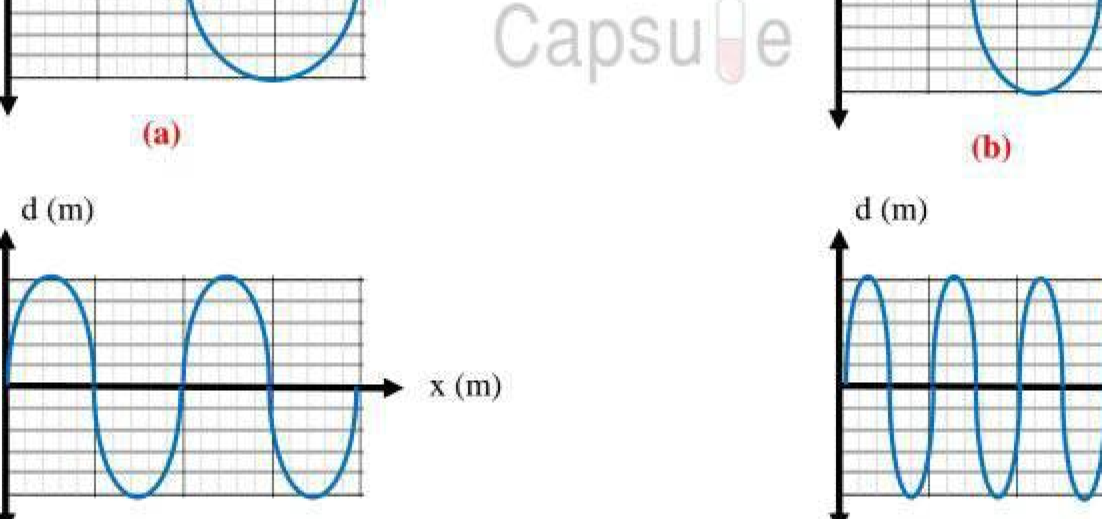
(iv) The propagation speed of the wave is……………..

a) 0.5 m/s b) 0.6 m/s

c) 50 m/s d) 60 m/s

5- A transverse wave is propagating in different media and the following graphs represent the relation between the vertical displacement (d) of the medium particles at a certain moment and the propagation distance (x) of the wave with the same scale. In which medium does the wave have the highest speed?





(a) (b) (c) (d)



6- A stone was thrown into a lake, so 50 waves were formed after 5 seconds from the collision of the stone with the water, when the radius of the outer circle was 2 m, then:

(i) The wavelength of the wave is................

a) 0.04 m　　　b) 0.08 m

c) 25 m　　　d) 100 m

(ii) The frequency of the wave is.............

a) 0.1 Hz　　　b) 10 Hz

c) 25 Hz　　　d) 250 Hz

(iii) The propagation speed of the wave is..........

a) 2.5 m/s　　　b) 2 m/s

c) 1 m/s　　　d) 0.4 m/s

7- A liquid of density 1000 kg/m^3 flows steadily inside a tube of cross-sectional area 0.5m^2 with a flow rate of 10 kg/s, then the flow speed of the liquid through the tube is equal to..........

a) 200 m/s　　　b) 50 m/s

c) 0.02 m/s　　　d) 0.05 m/s

8- Water flows steadily in a tube of cross-sectional area 10^{-3} m^2 , if the volume of water which is coming out from the tube within 30 minutes is 18 m^3 then..........

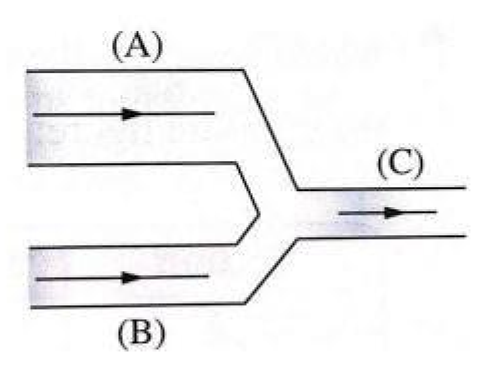
	Volume flow rate (m^3/s)	Speed of water flow (m/s)
(a)	0.01	10
(b)	0.01	600
(c)	0.6	10
(d)	0.6	600

9- If the ratio between the radii of two cross-sections of a tube in steady flow is $\frac{1}{2}$,then the ratio between the speeds of the liquid through them respectively is..............

a) $\frac{1}{4}$　　　b) $\frac{1}{2}$

c) $\frac{2}{1}$　　　d) $\frac{4}{1}$

10- In the opposite figure, the tubes (A) and (B) are different in cross-sectional area and the steady flow rate of the liquid inside each of them is 0.3 m^3/s. The two tubes meet to open in the tube (C) as in the figure, then the volume flow rate in the tube (C) is......



a) 0.1 m^3/s　　　b) 0.3 m^3/s

c) 0.6 m^3/s　　　d) 0.9 m^3/s

21- If the refractive index of medium X is double that of Y, so the speed of light in X ....that in Y.

a) Double b) half c) quarter d) 3 times

22- If the speed of wave is changed due to the change of medium this mean..........

a) Its frequency increase b) its periodic time increase
c) its wavelength doesn't change d) its periodic time doesn't change

23- The opposite figure show the change of potential energy with time of a pendulum started its motion from ....

a) Maximum displacement b) Maximum speed

c) Maximum kinetic energy d) minimum potential energy

24- the pest graph show the relation between the speed of light in air when its frequency change is ....

25- Two sound wave propagate in air their frequencies is 512Hz , 256Hz so the ratio between their velocities is................

a) 1:2 b) 2:1 c) 1:3 d) 1:1

26- The ratio between the angle of incidence in glass (n_g = 1.5) to the angle of refraction in water (n_w = 1.3).............

a) less than one b) greater than one c) equal one

27- When light travel from high dense medium to less dense medium, so the maximum angle of refraction in the less medium is..............

a) 180° b) 42°

c) 45° d) 90°

28- The ratio between the refractive index of red light to that of the violet light ....one.

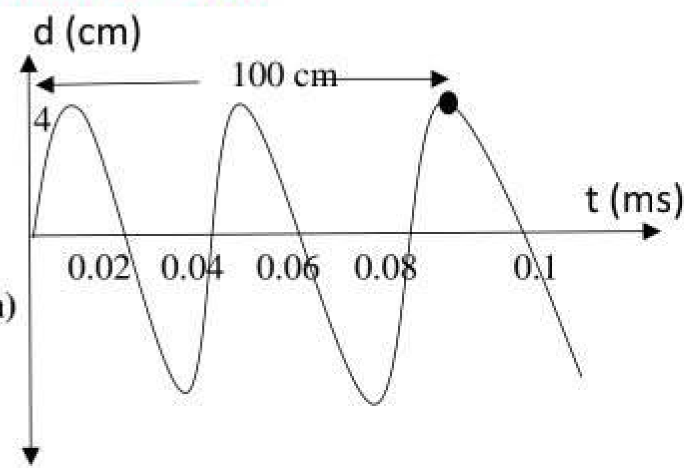
a) greater than b) equal c) less than

17- The opposite figure :

Illustrates the relation between the displacements and the time for a wave .

Calculate:

a) The wavelength
b) The wave velocity
c) Periodic time
d) Amplitude



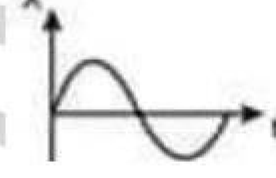
(0.4444m , $11.11x10^3$m/s , $4x10^{-5}$S , 4cm)

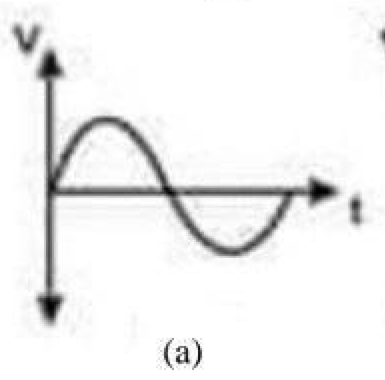
18- A stone was thrown in a lake so 50 waves were formed after 5 second from the colliding of the stone with the water where the radius of the outer circle is 2m find:

a)The wavelength b)The frequency

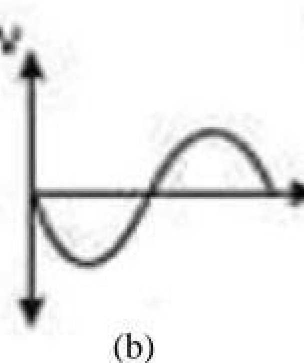
c) The wave velocity d) The periodic time **(0.04 m, 10 Hz, 0.4 m/s, 0.1 S)**

19- The opposite figure show the change of displacement of an oscillating object then the best graph that express the change in velocity of this object is………

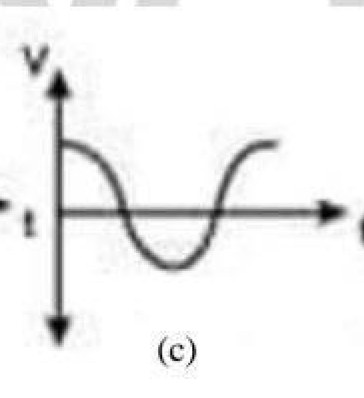




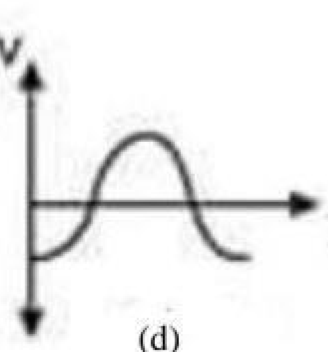
(a)



(b)



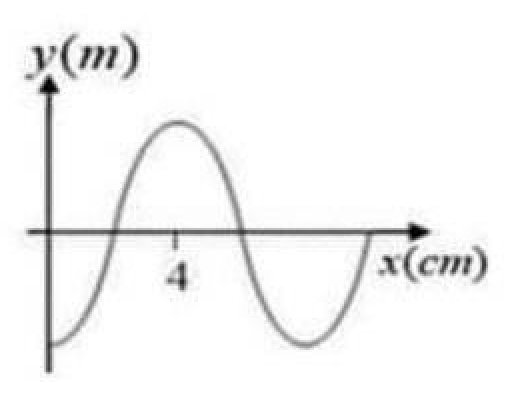
(c)



(d)

20- In the opposite figure the frequency is 8Hz, so the speed of this wave in m/s is……….

a) 0.64 b) 0.32 c) 6.4 d) 3.2



11- Blood flows through an artery with an average speed of 0.24 m/s. If the artery branches into 120 smaller arteries each of diameter that is $\frac{1}{4}$ of the big one, then the flow speed of blood in every small artery equals.........

a) 8×10^{-3} m/s b) 0.08 m/s

c) 0.032 m/s d) 0.3 m/s

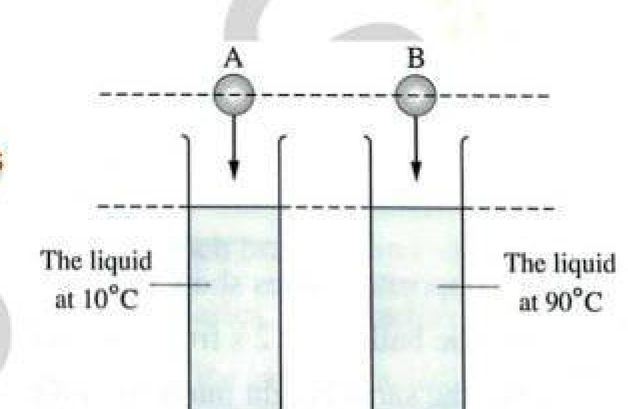
12- A layer of thickness x of a liquid of viscosity 0.2 kg/m.s is confined between two plates, one of the plates is static and the other which has an area of 2 cm² is moving with a uniform velocity such that it covers a distance 100 x through a time interval of 4 s, so the required force to move the plate equals..............

a) 10 N b) 10^{-3} N

c) 10^{-4} N d) 0.1 N

13- A car was travelling with high speed on a desert road when its driver noticed that the fuel was about to run out, what is the best strategy to save the fuel until reaching the nearest fuel station, considering what you have studied?

14- The opposite figure shows two metal balls (A, B) falling into two identical cylinders containing equal volumes of the same liquid with different temperatures, which of the two balls reaches the bottom of the cylinder first?



a) Ball A b) Ball B

c) The two balls reach the bottom at the same instant

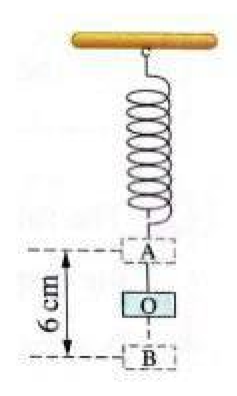
d) The two balls will never reach the bottom

15- A patient is injected by a needle of radius 0.3 mm, if the rate of the drug flow in cross-section of the needle is 0.5 cm³/s, then the speed of the drug flow in the needle is …………..

a) 1.24 m/s b) 1.77 m/s

c) 2.42 m/s d) 7.71 m/s

16- The opposite figure shows a load that is attached to a vibrating spring, so the amplitude of the vibration equals…………..



a) 3 cm b) 6 cm

c) 9 cm d) 12 cm

51- In one prism:

a) Its apex angle change according to the wavelength of light fall on it

b) Has a constant refractive index whatever the wavelength of light change

c) Its refractive index change by change the wavelength of light falling on it

d) The refractive index change by change the angle of incidence of light on it



52- In the opposite figure the medium which has maximum optical density…………..

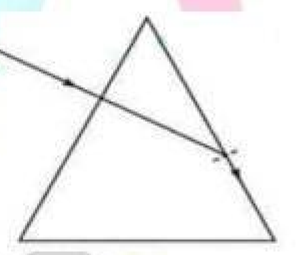



a) A   b) B   c) C   d) D



53- The opposite figure represents equilateral prism, so its refractive index is……….

a) $\frac{1}{2}$ b) $\sqrt{2}$ c) $\sqrt{3}$ d) $\frac{\sqrt{3}}{2}$



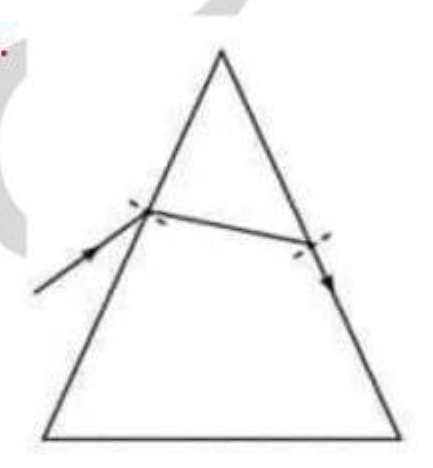
54- If a light ray fall as in the opposite figure then its apex angle…………….

a) greater than the critical angle

b) Smaller than the critical angle

c) Equal the critical angle

d) There is no relation with the critical angle



55- The ratio between the mass flow rate to volume flow rate for the same liquid equal………….

a) density of liquid   b) viscosity coefficient   c) speed of liquid

37- when the apex angle of a thin prism increase so its dispersive power …………..

a) increase b) decrease c) remain constant

38- In Young's experiment the path difference at the central fringe is……….

a) 0 b) 2λ c) λ d) $0.5\ \lambda$

39- The ratio between the wavelength of light in air to the wavelength of same light in water ……….one.

a) greater than b) equal c) less than

40- If the distance from the first crest to the third trough in a transverse wave = 25cm ,so the wavelength =………..cm.

a) 12.5 b) 10 c) 15 d) 5

41- When using red light instead of the green light, so the number of fringes in a unit length that is formed on the observation screen………….

a) Increase b) decrease c) increase then decrease d) doesn't depend on color

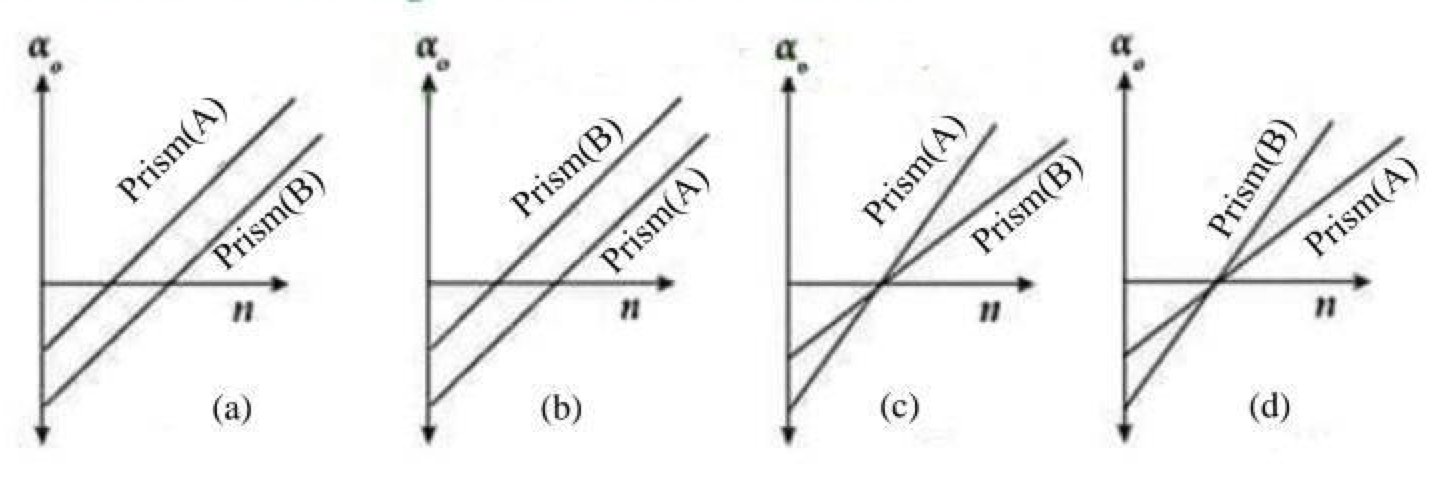
42- When red and blue light rays on a thin prism show which of the following relations is perfect to express the relation between the deviation angle and the apex angle.

(a) α_o – A: Red, Blue
(b) α_o – A: Blue, Red
(c) α_o – A: Red, Blue
(d) α_o – A: Blue, Red

43- When replacing source of red light under water surface by other blue, so the radius of the light appear on the water surface.

a) increase b) decrease c) doesn't change d) can't determine it

44- When replace a thin prism (A) by other (B) its apex angle is smaller than that of (A), so the right graph between the deviation angle and the refractive index is……….



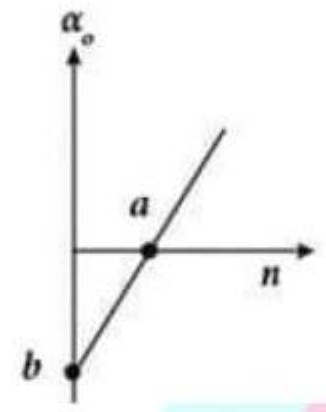
45- In the optical fiber the optical density of the outer layer ………… the optical density of the inner layer

a) greater than b) equal c) less than

46- The incident light rays differ than the reflected rays in……………

a) frequency b) speed c) wavelength d) intensity

47- In the opposite graph :



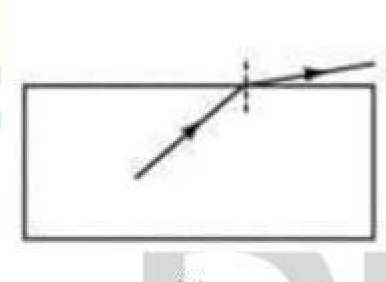
(i) The result of dividing (a) on (b) = …………..

a) $\frac{-1}{A}$ b) –A c) -1 d) A

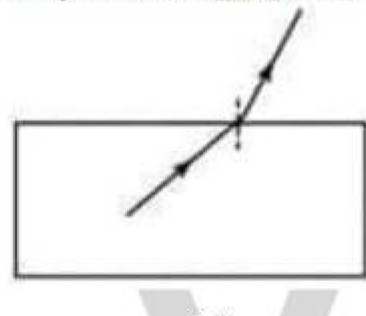
(ii) The result of dividing the value of slope on value of point (a)

a) $\frac{-1}{A}$ b) –A c) -1 d) A

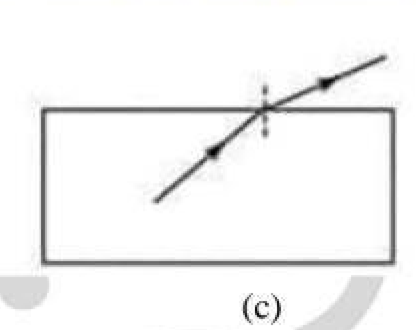
48- Three different mediums a light ray fall on it choose the medium which has greater critical angle.



(a)



(b)



(c)

49- Find the wavelength of light of frequency $5x10^{14}$ Hz when propagate in diamond of refractive index $\frac{5}{2}$ (knowing that the speed of light in space is $3x10^{8}$ m/s) ($240x10^{-9}$ m)



50- In the opposite figure choose the correct answer

Medium (2)

Medium (1)

a) the optical density of (1) is greater than (2)

b) angle of incidence is less than the angle of refraction

c) the light ray may emerge tangent if it is fall from medium (1) to medium (2)

d) the light ray may emerge tangent if it is fall from medium (2) to medium (1)

حمل الان

مجانا وحصريا

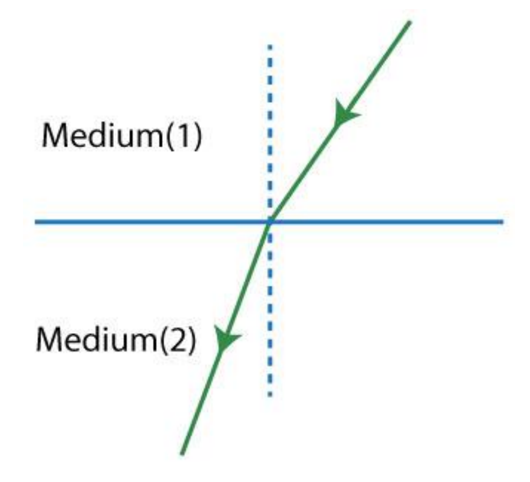
امتحانات رقم (1)







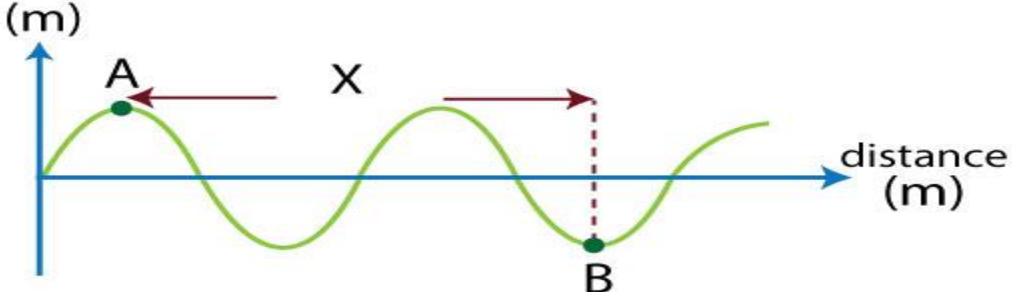
1. A light ray fell from medium (1) its absolute refractive index is 1.3 to medium (2) its absolute refractive index is 1.5 as shown in the figure.



Which one from the following choices shows what happens for both wavelength and the velocity of the light wave in medium (2)?

	Wavelength	Velocity
A	Increases	Increases
B	Decreases	Increases
C	Increases	Decreases
D	Decreases	Decreases

2. The graph represents a wave motion with wavelength (λ)



The horizontal distance (x) between the two points A and B represents ………..

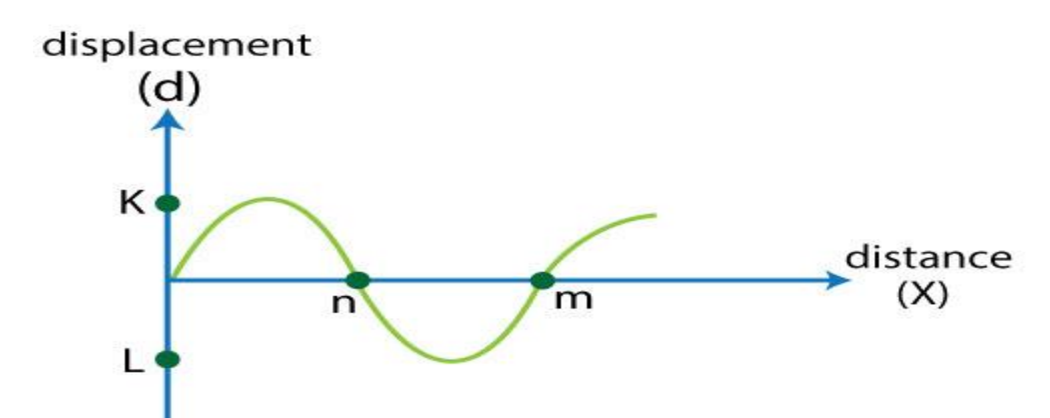
A. $\frac{3\lambda}{2}$

B. $\frac{2\lambda}{3}$

C. 2λ

D. λ

3. The graph represents the relation between the displacement of one from medium particles during a certain time (d) and the covered distance by the wave during the same time (x).



Which one from the following choices represents the wave amplitude and wavelength?

	Wave amplitude	Wavelength
A	The distance KL	The distance mn
B	A half of distance KL	A double of distance mn
C	A double of distance KL	The distance mn
D	A half of distance KL	A half of distance mn

4. In Young's experiment to study the light interference, a monochromatic ray its wavelength 6000 A° was used forming fringes on an observing screen at distance (R) from the double slits and the distance between two successive bright fringes was (Δy_1). If another monochromatic light its wavelength 4000A° is used and the distance between the double slits and the observing screen is doubled , the distance between two successive bright fringes becomes (Δy_2),**the ratio $\frac{\Delta y1}{\Delta y2}$ = ……….**

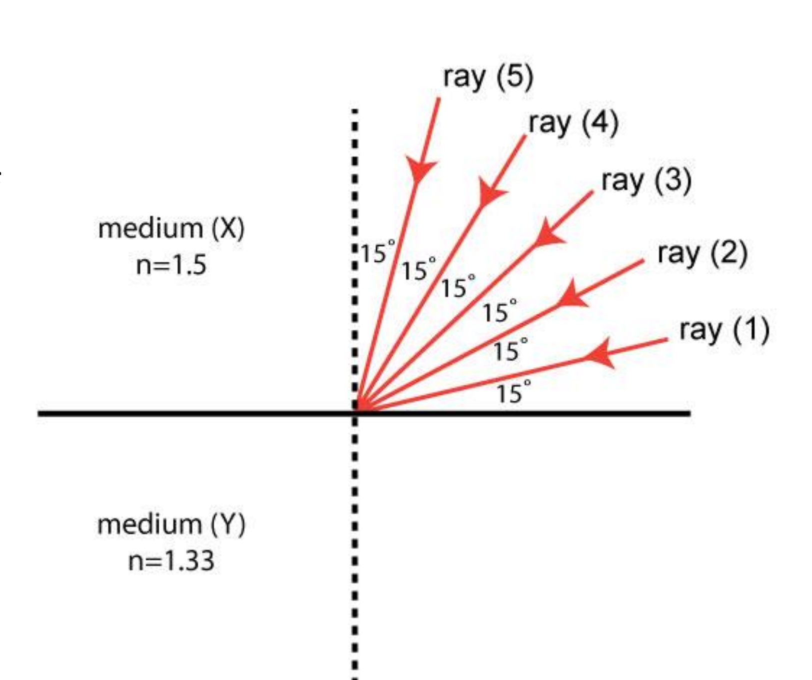
   A. $\frac{3}{4}$

   B. $\frac{4}{3}$

   C. $\frac{6}{4}$

   D. $\frac{1}{3}$

5. Five light rays are separated by equal angles each angle is 15° as shown in the figure if these light rays fall from medium (x) its absolute refractive index is 1.5 to medium (Y) its absolute refractive index is 1.33



How many rays can penetrate to medium (Y)?

A. Four rays
B. Three rays
C. Two rays
D. Five rays

6. Two thin prisms made of same material their apex angles (5° and 10°), **the ratio between their dispersive power** $\frac{(w_{\propto 0})_1}{(w_{\propto 0})_2} = \ldots \ldots \ldots \ldots \ldots \ldots$

A. 0.5
B. 0.6
C. 1
D. 2

7. A light ray falls with angle of (45°) on one side of a triangular prism its apex angle is 30° and emerged normally from the opposite side, **so the angle of deviation = ……………………………**

A. 15°
B. 20°
C. 25°
D. 30°

8. Four identical metallic balls are fallen down from the same height, each ball toward a separate jar where each jar contains a different liquid from the other jars then the taken time by each ball to reach the bottom of the jar is recorded in each case as the following:

The jar	The time taken by the ball to reach the bottom
1	0.2 s
2	0.3 s
3	0.6 s
4	1 s

Which jar contains the liquid with higher viscosity?

A. Jar 1
B. Jar 2
C. Jar 3
D. Jar 4

9. A liquid flows with velocity (v) through a uniform tube, its diameter is (X) and a cork has small aperture is put at one end of this tube. If the diameter of the small aperture is ($\frac{X}{4}$). **The velocity of emergent water from the small aperture = ………………….**

A. 16 v
B. 4 v
C. $\frac{1}{4}$ v
D. $\frac{1}{16}$ v

10. A wave its frequency (100 Hz) propagates in air with velocity of 320m/s, **calculate its wavelength.**

……
……
……

11. A light wave propagates with velocity 2×10^8 m/s through a certain medium its refractive index 1.5 if this light wave transfers to another medium its refractive index is 1.2, **Find the velocity of light in the second medium.**

……
……
……

12. A thin prism of apex angle 10°, its absolute refractive index of both blue and red colors (1.53 and 1.51) respectively.

Calculate the average deviation angle.

……
……
……



كيفية طباعة صفحات معينة من ملف معين

مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9



خطوة 1

خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي – ثم نكتب 9

خطوة 4
اختيار نوع الورق

خطوة 5
اختيار A4

خطوة 6